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FACTORS AFFECTING DISTRIBUTION OF TRAINED TEACHERS AMONG RURAL WHITE ELEMENTARY SCHOOLS OF NORTH CAROLINA

By

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J. W. C.

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FACTORS AFFECTING DISTRIBUTION OF TRAINED TEACHERS AMONG RURAL WHITE ELEMENTARY SCHOOLS OF NORTH CAROLINA

CHAPTER I

NATURE OF THE PROBLEM

STATEMENT OF THE PROBLEM

The purpose of this study is to find the significant conditions surrounding certain types of schools in North Carolina which cause some of them to have relatively well-trained teachers, and others to have relatively poorly-trained teachers. It is common knowledge that rural schools differ tremendously in the training of the teachers who have charge of them. In one school we find that all the teachers have the equivalent of a college education; in another we find teachers with less than a high school education. To what extent is this circumstance due to difference in the amount of salary which the respective schools offer? What weight does the wealth and progressiveness of the community have in attracting trained teachers? Does the length of term of the school or the size of the school influence a trained teacher to go to one community rather than to another? What steps should an individual school district take in order to attract better-trained teachers? What effect will a state-wide salary schedule based on training, and embodying the single-salary feature, have toward improving the training of teachers in the elementary schools? How effectively have the salary schedule and the certification laws of North Carolina brought training into coördination with salary? These are some of the questions which this study undertakes to answer.

PROBLEMS IN THE FIELD OF STATE ADMINISTRATION OF SCHOOLS TO WHICH THE STUDY IS RELATED

Through a minimum salary law graduated according to training and experience, and by means of a certification scheme closely coördinated with the state-wide salary schedule, North Carolina has attempted to regulate the salary of teachers in accordance with their training and experience. This study undertakes to determine to what extent salary has been made dependent upon academic and professional training through the operation of its salary schedule and its scheme of certification. It gives some light on the question of how effective the salary schedule and the certification scheme have been in actual practice.

North Carolina has an equalization fund the purpose of which is to lessen the inequalities among the counties in ability to support the minimum educational program. Since the state minimum salary schedule is used as a basis for distribution of this fund, it is evident that the salaries of the teachers in a given county are used as a measure of the educational need of that county. Can we be assured that this measure of educational need will give the small, short-termed, economically backward rural community as good an opportunity to get a trained teacher as it gives the large school running for a relatively longer term and situated in a wealthy county of the state? Mort[1] states three criteria for determining a measure of educational need; the second of these is: "Unusual expenditures for meeting the general requirements due to causes over which a local community has little or no control may be recognized as required by the equalization program." This criterion would demand a consideration of such factors as the following in measuring the educational need of a community: (*a*) transportation in sparsely settled communities; (*b*) necessity of higher salaries because of the higher cost of living in certain cities; (*c*) the necessity of higher salaries in order to get trained teachers to go to certain rural districts. A study of the factors affecting distribution of trained teachers in North Carolina shows just what are the conditions surrounding certain schools which make it relatively easy or relatively difficult to get trained teachers to accept work in them. This study reveals not only the nature of such conditions, but also the extent to which they are operative.

When salaries offered in all rural schools are regulated according to the training of the teacher, if the nature, extent, and importance of conditions which cause trained teachers to accept work in one school rather than another are known, it is possible to attract trained teachers to those schools which have hitherto been undesirable locations by either or both of two methods: (1) An attempt may be made to equalize as much as possible the unattractive conditions surrounding the school which has a poorly-trained teacher; for example, if the size of the school were found to be a factor, small schools might be eliminated by means of consolidation. (2) Additional salary may be offered in the unattractive school in such manner as to compensate for the undesirable conditions. If either or both of these methods are used, the result will be a greater equalization of educational opportunity because trained teachers will be more evenly distributed.

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[1] Mort, Paul R. *Measurement of Educational Need*, p. 6.

If it seems desirable to attempt to attract better-trained teachers to undesirable schools by means of a salary bonus, a knowledge of the conditions which hinder certain schools in getting trained teachers will guide administrators of state school systems in offering such a bonus. It is now a recognized principle of state-wide salary schedule construction that provision should be made for differences in the cost of living in various communities.[2] Should provision also be made for differences in desirability of working conditions? If so, what are these conditions in rural schools and how important are they? How should the salary schedule be modified to compensate for such conditions? The determination of factors affecting the distribution of trained teachers will help us to answer these questions.

Will a state-wide single salary schedule, fixing the minimum monthly pay of teachers in terms of training and based on the principle that the minimum salary shall be the same whether the teacher works in an elementary school or in a high school or in a city school or a rural one, help improve the training of teachers in the rural elementary schools of a state? North Carolina's salary and certification laws were put into operation with this purpose in mind, and it is the opinion of informed school men in the state that the scheme has successfully accomplished its purpose. Although this study does not present complete substantiation of this opinion, it presents evidence which shows that it is probably correct.

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[2] Evenden, E. S. "Essential Features of a State Salary Law." *Educational Review*, October 1920, Vol. 60, No. 3, p. 209.

The method used in this study suggests a procedure and a technique for either revising existing state schedules or setting up new salary schedules in states which have not previously attempted to regulate salary according to the training and experience of the teacher. The conditions revealed by this study of conditions in the rural elementary schools of North Carolina suggest the importance of requiring a minimum yearly salary rather than stating a monthly salary as a minimum. This principle is especially important in states where the length of term varies considerably.

SCOPE OF STUDY

Training as used in this study is defined in terms of the certificate which a teacher holds. Teachers' certificates in the state have been graded according to the number of years of academic training plus a certain minimum of professional training. No attempt is made to study the nature or effectiveness of the training represented by a given certificate. The question as to what extent training increases the efficiency of a teacher is not considered. It is taken for granted that the type of training recognized under the certification scheme of North Carolina actually increases the effectiveness of a teacher, and that it is desirable to have teachers with the maximum training recognized under the salary schedule, viz., graduation from a standard college (one which offers an A.B. degree), including four years' work beyond high school graduation, eighteen semester hours of which must be in the Department of Education. In some instances certificates do not actually represent the college training for which they are supposed to stand, due to the fact that experienced teachers were granted state certificates in 1920 (when the present certification scheme was put into operation) on recommendation of superintendents of schools and boards of education. The regulation of the Department of Certification required in such instances evidence of experience and professional fitness which was considered the equivalent of the training required under the certificates granted. In measuring the training of teachers no attempt was made to go back of the regulations of the State Department of Certification in fixing the meaning of certificates in terms of training, but these were in every instance accepted at their face value.

This study was confined to the rural [3] white elementary schools of the state. This particular group of schools was selected for the study because it is the largest homogeneous group and probably the most important from the standpoint of an equalization program. Although the findings may throw some light on conditions in the city schools or in the high schools of the state, they are not presented as valid except for the rural elementary schools of the white race. No conclusions as to the colored schools of the state are presented. Similar studies of conditions in the other groups of schools (city elementary schools, city high schools, rural high schools, all types of schools for negroes) seem desirable.

It is recognized that certain factors affecting the distribution of trained teachers are not included in this study. Only those conditions which can be treated through objective measurement are considered. The results of the study show that some factors have been omitted or that some of the measures used were inadequate. No subjective data, i.e., mental attitudes of teachers, such as preference for working near home or the desire to work under a certain supervisor or to be near friends, have been included. It is probable that most factors of this nature were equalized by the large number of cases included in the study.

SOURCES AND NATURE OF DATA

There are one hundred counties in North Carolina. Out of this number thirty counties were selected at random, giving a total of 1,393 schools. It was decided to use counties rather than schools as the unit of sampling because about half of the factors considered were county-wide in their nature and measures applicable to the individual schools could not be obtained. For instance, in North Carolina the county is the unit of support for schools for the six months' term (except for a comparatively small equalization fund). It seemed possible that the differences in economic and social progress of a whole county might set the standards for teachers in that county. A preliminary study of the training of teachers in various counties showed that this was the case. It was found, for instance, that Durham County—one of the wealthiest and most progressive counties—had teachers in its rural white elementary schools with an average well above two years of college training, while the typical teacher in the same group of schools of Randolph county—a county which is relatively unprogressive and poor—had less than a high school education. Other factors studied showed a similar county-wide variation; hence the sampling of data was made by counties. Measures of some factors were obtained for each individual school, and for other factors the county as a whole was used as the unit of measurement.

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[3] Any school located outside of a special charter district is considered a rural school in North Carolina. See page 80.

The 1,393 schools studied were located in the following counties: Alamance, Alexander, Avery, Buncombe, Burke, Carteret, Chowan, Clay, Cumberland, Duplin, Durham, Gaston, Guilford, Halifax, Hertford, Johnston, Jones, Macon, Mitchell, Montgomery, Northampton, Pender, Perquimans, Randolph, Rutherford, Sampson, Surry, Vance, Wake, and Wayne. All of the rural white elementary schools in each county were studied. Since the data were obtained from thirty counties selected by chance, including 30 per cent of the counties of the state, located in all sections, they are evidently typical of the real conditions; and the conclusions drawn from the data may be taken as applying to the state as a whole.

Most of the statistics for individual schools were obtained from the county budgets submitted to the State Superintendent of Public Instruction according to law. The data studied were for the school year, 1923-1924. Since the 1924-1925 budgets were submitted while the study was in progress, these were used to supplement the data contained in the budgets of the previous year. The form for these documents required that certain information contained in the report be duplicated in the 1924-1925 report. This fact made it possible to obtain for every school complete statistics for the school year of 1923-1924; hence it was not necessary to omit any schools from the study on account of incomplete data. A more detailed treatment of the nature of data is given in Chapter V in connection with the explanation of how the measures of factors were obtained.

At this point it is essential to give an explanation of the Index of Training which is used throughout the study. This index is based on the fact that the certification law of North Carolina recognizes seven levels of training, varying from a ninth-grade education through standard college graduation. Table VIII shows the equivalence between certificates and years above elementary school graduation. The lowest certificate, which is equivalent to two years in high school, is assigned an index value of 200. The highest grade certificate, based on graduation from a standard A Grade college, has an index of 800. The following key will aid in the interpretation of Indices of Training.

200 indicates completion of the second year of high school.
300 indicates completion of the third year of high school.
400 indicates high school graduation.
500 indicates completion of one year of college work.
600 indicates completion of two years of college work.
700 indicates completion of three years of college work.
800 indicates graduation from a standard college.

METHOD OF TREATMENT OF DATA

Statistics for the various schools and counties were treated so as to remove any factors which logically appeared to be extraneous to the problem. As nearly as possible various measures of factors affecting the distribution of trained teachers among the rural white elementary schools were obtained and the crude data were refined by statistical manipulation, so as to weight properly the elements which one would logically suppose to have an effect on the distribution of trained teachers. The relations and interrelations of various measures were studied by means of the correlation technique; by means of multiple correlations the significance of all the factors included was obtained; through partial correlations the importance of the measures in affecting the distribution of trained teachers was found, and a regression equation showing the relative weights of the factors was built up. The correlation coefficients of the zero order used in these calculations were obtained by the Toops Formula, a special form of the Pearson Product-Moment Formula. The details of this technique will be explained in Chapter IV.

The statistical techniques mentioned above have been used so frequently in recent educational and social studies that it is unnecessary to explain their meaning or purpose to the professionally-trained reader. It will be sufficient to remind the average reader of this article of the following facts in the field of statistics: The coefficient of correlation between two series of measures expresses a "going-togetherness," but does not prove that a significant relationship really exists between the two measures, because this coefficient "often represents not simply the degree of relationship existing between these measures in themselves, but the degree of this relation plus the indirect effect of other factors to which they are both related. For this reason in measuring the correlation between two sets of measures, it is necessary that we eliminate or rule out as far as possible those uncontrolled factors which through common relation to the measures to be correlated tend to raise or lower the 'net' correlation."[4] This is accomplished by means of partial correlation which gives the relationship between the measures when other intercorrelated measures are held constant. "In short, a coefficient of partial correlation may be said to represent the net relation between two variables when one or more other variables which might increase or decrease the true correlation have been ruled out or held constant."

The following paraphrase of a paragraph from Garrett[4] explains briefly the nature of multiple correlation and the regression equation:

> In addition to its value as a device whereby we are able to control conditions by ruling out disturbing factors, partial correlation is highly important also in that it enables us to build up regression equations involving three or more variables from which a measure (known as the criterion) may be predicted when we know the corresponding measures for the other factors involved. The value of the regression equation in estimating a criterion—its accuracy as a predicting instrument—may be determined from the "multiple" coefficient of correlation. This coefficient gives the correlation between actual criterion measures and the measures of the criterion when predicted from the factors included in the regression equation.

The above explanation of the technique used in the study will give a general idea of the method of investigation. A detailed treatment of the technique used will be found in Chapter IV.

SIMILAR AND RELATED STUDIES IN THE FIELD OF EDUCATION

Some of the techniques used in this study have been explained in detail by H. M. Ivy[5] and G. H. Reavis[6] in studies in the field of education. Reavis found the factors controlling attendance in rural schools, and isolated the various factors by means of partial correlations. Ivy used correlations in finding the inter-relations of academic training, experience, intelligence, and achievement in standard tests for rural teachers in Mississippi; he found to what extent each factor influenced pay by means of partial correlations, and judged the significance of the factors considered by means of the multiple correlation technique; he also built up a regression equation showing the relative weight of these factors in determining the pay of teachers in the Mississippi rural schools. The reader will find in the dissertations by Ivy and Reavis detailed explanations and illustrations of many of the techniques used in this study.

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[4] Garrett, Henry E. *Statistics in Psychology and Education*, p. 221.
Also, McCall, William. *How to Experiment in Education.*

[5] Ivy, H. M. *What is the Relation of Academic Preparation, Experience, Intelligence, Achievement, and Sex of Rural Teachers in Mississippi to Their Pay?*

[6] Reavis, G. H. *Factors Controlling Attendance in Rural Schools.*

The work of Ivy is of special significance in that it enables us to compare the relationship between academic training and salary in North Carolina with another southern state where conditions are rather similar except that Mississippi does not have a minimum salary schedule for its teachers.

The phases of this problem having to do with equalization of the distribution of trained teachers grow out of studies by Mort[7] and Morrison.[8] The former stated principles on which a program of educational equalization should be based. Morrison proposed a scheme for equalization of the financial burden of education among the counties in North Carolina, using teachers' salaries according to the minimum salary schedule as the measure of educational need. This made it desirable to find whether or not factors other than the salary schedule affected the distribution of trained teachers among various types of schools in the state in order that the equalization scheme might take such factors into consideration.

[7] Mort, Paul R. *The Measurement of Educational Need;* also *State Support for Public Schools.*

[8] Morrison, Fred W. *Equalization of the Financial Burden of Education among Counties in North Carolina.*

CHAPTER II

EDUCATIONAL CONDITIONS IN NORTH CAROLINA

The purpose of this chapter is to give the reader such an understanding of conditions in the state as will help toward interpreting the findings of this investigation. With this end in view, first, a brief history of salary and certification legislation is given; then, the present scheme for regulating salary according to training is explained; next, the relation of the salary schedule to the problem of equalization is shown; finally, the status of various factors involved in the study is discussed, viz., the training of rural teachers, their salaries, the length of term of schools, and the effect of local initiative in providing a program in excess of that required by the state.

SALARY AND CERTIFICATION LAWS IN NORTH CAROLINA

The development of certification of teachers in North Carolina has been similar to that in other states. Only within the last ten years has the state attempted to control the certification of its teachers. Katherine Cook has given the following description of how certification of teachers developed in most states:[1]

> In general the development is about as follows: Beginning with local district or township inspectors or examiners, the certifying power passed into the hands of county superintendents. As state departments of education were definitely established and assumed importance and prestige, more and more educational power was granted them. Higher efficiency and more unified requirements were secured under these new conditions by including among the legal duties of the State Department of Education that of granting certificates of state-wide validity and that of influencing or controlling the whole matter of certificating teachers.

The first attempt of the state of North Carolina to supervise directly the certification of its teachers came with the creation of the State Board of Examiners and Institute Conductors by the General Assembly of 1917.[2] This board was composed of six members, three men and three women. The state superintendent of public instruction was an ex-officio member. The board had entire control of the examination and certification of all teachers and superintendents in the elementary and secondary schools except teachers of second- and third-grade certificates. These two types of certificates were the lowest in use and the county and city superintendents had the right to issue them.

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[1] Cook, Katherine M. *State Laws and Regulations Governing Teachers' Certificates*, pp. 8 and 9. Department of Interior, Bulletin No. 22, 1921, Government Printing Office, Washington, D. C.

The *Report of the State Board of Examiners and Institute Conductors* [3] was published in 1918 and shows that there were two bases for the issuance of certificates: (1) Upon the basis of training which was evidenced by a transcript of a college or school record, and (2) on the basis of examinations which were sent out by the State Department of Education and taken by prospective teachers at the respective county seats. The papers were returned to the State Board of Examiners for correction. The report of the board shows that some effective work was done in regulating the certificates of teachers in accordance with their training. On June 1, 1917, there were 1,160 certificates in force. From that date to November 30, 1918, the following certificates were issued to teachers on the basis of either examination or transcript of training: 2,112 term certificates (originals and renewals), 7,897 temporary, 1,049 emergency. These figures indicate that under the Law of 1917 state certification of teachers was fairly successful.[4] The significance of the certificates issued was decreased by a ''gentlemen's agreement'' with the city and county superintendents in accordance with which holders of first-grade certificates were issued state certificates according to the recommendation of their superintendents.

In 1919 Dr. J. Y. Joyner, who had been state superintendent of public instruction a score of years, resigned and the governor appointed Dr. E. C. Brooks to serve for the remainder of the term. Dr. Brooks took steps at once to place the certification of teachers on a more uniform basis. The higher institutions of the state were requested to aid the State Department in erecting some standards by which colleges might be rated. These institutions gave ready coöperation, and standards for their classification were drawn up. On the basis of these standards institutions were rated as giving one, two, three, or four years of college work, and their graduates were issued certificates corresponding to the number of years of academic training offered by the institution. For each type of certificate, a certain minimum of professional work was required.[5] An investigation of the training of the teachers actually at work in the schools during 1919-1920 showed that about two-fifths of the white teachers were unable to measure up to the lowest standard state certificate which requires the equivalent of graduation from a standard high school. This deplorable situation was probably due in part to the large increase in enrollment in the schools and the war emergency which had drawn trained teachers into other occupations.

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[2] *Biennial Report 1916-1918*, p. 33. Superintendent of Public Instruction, Raleigh, N. C.

[3] *Ibid.*, pp. 77-96.

[4] *Public Education in North Carolina*, p. 51. A report by the State Educational Commission, Edwards and Broughton, Raleigh, N. C., 1920.

Realizing the need for improving the training of the teachers in the state, Dr. Brooks first inaugurated a program of summer school training and permitted teachers to raise their certificates by summer school attendance. He then turned his attention towards improving the certification scheme of the state. In his biennial report,[6] Dr. Brooks stated his point of view on certification as follows:

> A successful teacher should possess the following qualifications: (1) Scholarship or knowledge of the subject matter to be used in school for the education of children; (2) professional training or the understanding of child nature and how to use the subject matter to the best advantage; (3) experience, or a certain skill in teaching derived from practice and (4) personality, or a mode of expression and a manner of living that reinforces technical instruction. A teacher's certificate should define to a certain extent the first three qualifications; namely: scholarship, professional training, and experience. A teacher may have all three but still be a poor instructor because of her personality.

Under the guidance of such ideas the legislature of 1921 abolished the State Board of Examiners and Institute Conductors and gave the State Board of Education the authority to provide for the certification of teachers and to issue state certificates.[7]

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[5] "A State System of Public Schools," *Biennial Report for 1920-1922*, p. 9. State Superintendent of Public Instruction: Educational Publication No. 61.

[6] *Ibid.*, pp. 30 and 31.

[7] *The Public School Law of North Carolina* (Codification of 1923), pp. 104-107. State Superintendent of Public Instruction, Raleigh, N. C.

The board was given the power "to prescribe rules and regulations for examining, accrediting without examination and certificating all applicants" for positions in the schools; but the right of county superintendents to issue second- and third-grade certificates for teachers below the state certificate requirements was not repealed.

The following summary from Dr. Brooks's biennial report gives a clear exposition of the scheme of certification which the State Board of Education set up in accordance with the Law of 1921:[8]

> The state issues two classes of certificates: (1) The Standard and (2) the Non-Standard, and the Department of Education has a record of the scholarship, professional training and experience of every teacher to whom a State Certificate is issued. The lowest standard certificate is based on graduation from a standard high school plus six weeks of professional training. Each year of full college credits beyond high school together with a fixed amount of professional training in the art of teaching and managing pupils and the principles of education, entitles the teacher to a certificate one grade higher. . . . Therefore the highest certificate issued is upon graduation from a standard four-year college including a certain amount of professional training and experience. Moreover, the plan is broad enough to place in this standard class our good, experienced teachers of long service although they may not be able to present high school and college credits. Many of these are certificated in the highest class to-day.

The desirable features of the certification scheme may be summarized as follows: (1) It stated clearly and specifically the academic and professional preparation which was required for each type of certificate; (2) it differentiated the certification requirements for high school, primary, and grammar grade teachers; (3) it prescribed in general the requirements of the teacher training courses leading to each type of certificate; (4) for the various levels of certificates (according to academic and professional training) salaries were fixed which increased with training and experience of the teacher. In order to understand the significance of this last and probably most important feature, one should be familiar with the salary schedule which was adopted in 1920.

The Board of Examiners and Institute Conductors of 1917-1919 was handicapped in its attempt to certificate teachers of the state because of the fact that salaries were on a very low level. The state certificates did not pay a great deal more than the second- and third-grade certificates which could be issued by local authorities. In 1917-1918 the average annual salary of rural white teachers was only $276.00.[9] The low salaries caused large numbers of teachers to leave the service for the more remunerative employment offered because of war conditions, and the legislature of 1919 tried to remedy the bad conditions by raising salaries on local certificates from $35.00 per month to $45.00 and by giving increases of from 10 per cent to 25 per cent to holders of state certificates.

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[8] "A State System of Public Schools." *Biennial Report, 1920-1922,* p. 30. State Superintendent of Public Instruction: Educational Publication No. 61.

> The salaries provided by the legislature of 1919 were neither sufficient to prevent the further depletion of the teaching staff, nor to induce young people to enter the profession. Far-reaching measures were necessary if the schools were to be saved from the impending crisis. The efforts of those in authority to meet this situation culminated in the legislation of 1920.[9]

The general assembly at the special session of August, 1920, passed an act requiring the state superintendent to recommend annually to the state board of education for adoption a uniform graduated salary schedule for all teachers in the public schools. This salary schedule was to be used as a guide by county boards of education in preparing the school budget, and as a basis for apportionment of the state public school fund.[10] Superintendent E. C. Brooks recommended for the white schools the schedule given in Table I and this was adopted by the State Board of Education.[11]

The meaning, purpose and use of the salary schedule will be made clearer by answers to the following questions: (1) In what way does the schedule differentiate salary according to the training and experience? (2) What is the relationship of the salary schedule to the minimum state program which is used as a basis for distribution of the equalization fund? (3) How does the minimum salary provided in the law affect the actual salaries paid to teachers? These questions are answered here in the order proposed.

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[9] *Public Education in North Carolina*, pp. 48-49. A report by the State Educational Commission. Edwards and Broughton, Raleigh, N. C., 1920.

[10] *Public Laws of 1920*. Section 4, Chapter 91.

[11] *The Salary Schedule and Classification of Schools*. State Superintendent of Public Instruction: Educational Publication No. 51, Division of Finance and Statistics No. 3, Raleigh, N. C.

TABLE I

A GRADUATED SALARY SCALE FOR WHITE TEACHERS

(Monthly Basis)

STANDARD CERTIFICATES	EXPERIENCE RATING				
	No Yr.	1 Yr.	2 Yrs.	3 Yrs	4 Yrs.
High School					
Grammar Grade					
Primary					
Class A	$100.00	$105.00	$110.00	$120.00	$133.33
Class B	90.00	95.00	100.00	105.00	110.00
Class C	85.00	90.00	95.00	100.00	105.00
Provisional Class C	75.00	80.00	85.00	90.00	95.00
Elementary					
Class A	75.00	80.00	85.00	90.00	95.00
Class B	65.00	70.00	75.00	80.00	85.00
Provisional Elementary	55.00	60.00	65.00	70.00	75.00

CERTIFICATES BELOW STANDARD

Temporary	$60.00
Provisional A	55.00
Provisional B	50.00
County Second Grade	45.00

REGULATION OF SALARIES ACCORDING TO EXPERIENCE AND TRAINING

The columns in the schedule extending from left to right show increases in salary allowed for each additional year of experience. Thus the top line of figures should be read as follows: A teacher holding a Class A certificate is entitled to a minimum salary of $100.00 per month if she has no experience; $105.00 per month if she has taught one year; $110.00 per month after teaching two years; $120.00 per month for three years' experience; no increase in salary is allowed for experience after the fourth year of teaching. Salaries on non-standard certificates are given at the bottom of the schedule and no credit for experience is allowed on certificates below standard.

The classes of certificates reading down the page are based upon different amounts of training. There are three general levels of state certification; (*a*) the level representing two or more years of college training which includes High School, Grammar Grade, and Primary Certificates, Classes A, B, and C, and Provisional Class C; (*b*) Elementary Teachers' Certificates extending from high school graduation through completion of one year's standard college work and including the Elementary Class A, Elementary Class B, and Provisional Elementary Certificates; certificates below the standard of high school graduation; viz., Temporary, Provisional A, and Provisional B. The County Second-Grade Certificate is issued by local school authorities. Classes of certificates differ by one year of training as we read down the schedule:

> The high school, grammar grade, and primary certificates, Class A, are based upon graduation from a standard A grade college, in academic or scientific courses, including eighteen semester hours of professional work; Class B upon completion of three years of standard college work or graduation from a standard normal school, including twelve semester hours of professional credits; Class C upon credits for two years of standard college work, including six semester hours of professional training. The elementary teachers' certificate, Class A, is based upon credits for one year of standard college work or one year of standard normal school credit. The elementary certificate, Class B, is based upon graduation from a standard high school plus one unit of summer school credit.[12]

The Temporary, Provisional A and B certificates are considered by the state department as representing three years of high school training, and the county second grade as representing about ninth grade graduation, but these non-standard certificates differ from one another mainly in the number of units of county summer school work for which the teacher has credit.[13]

Any of these state certificates could at first be obtained by an examination on the academic subject matter and attendance at summer school for the professional credits, but this method of obtaining certificates was made so much more difficult than school attendance that it has gradually ceased to be used and certification has come to be based mainly on transcripts of school or college records. The whole scheme of certification represents, then, a ladder extending from the second year of high school through college graduation. This fact makes it possible to assign to each class of certificate a definite value in years of training.

[12] Morrison, F. W. *Equalization of the Financial Burden of Education Among the Counties in North Carolina,* p. 21. Also see:

Regulations Governing Certificates for Teachers in North Carolina. State Superintendent of Public Instruction: Educational Publication No. 29, Division of Certification No. 11. Raleigh, N. C., 1921.

[13] For detailed explanation of differences in non-standard certificates, see: *County Summer School Manual for 1921.* State Superintendent of Public Instruction, Educational Publication No. 16, Division of Certification No. 3, Raleigh, N. C.

The index of training used as the criterion in this study is based on the academic training represented by certificates.[14]

RELATION OF THE SALARY SCHEDULE TO EQUALIZATION

The salary schedule, in combination with the constitutional requirement of a six-months' school term and laws regulating the apportionment of teachers according to average daily attendance, determines the minimum program of education on which the state bases its scheme of equalization.[15] The General Assembly of 1923 provided an equalizing fund of $1,250,000 which was distributed according to the following scheme: The total amount of the salaries of principals and teachers under the salary schedule for the six months' term (actually the average for two previous years was taken) was found for each county, the salaries of any teachers in excess of the legal number being omitted.[16] In counties where the gross yield of the legal tax rate for the six months' term was not sufficient to pay the salary of principals and teachers, the balance was allowed from the equalizing fund. In all essential phases this method of apportioning the equalizing fund is still in use. It is evident, then, that teachers' salary schedule is an important element in measuring the educational need of a county for maintaining the minimum state educational program. To the extent that the school conditions in one county attract trained teachers and those in another county repel them, a uniform salary schedule is not a fair measure of educational need. From all of this it follows that the salary schedule has an important bearing on the problem of equalization in the state.

MINIMUM SALARY SCHEDULE AND ACTUAL SALARIES

It is important to remember that the salary schedule determines the minimum amount which a teacher may be paid, but does not fix the maximum salary. Theoretically, the schedule provides the same salary for the elementary teacher as it does for those in the high school, but in practice high school positions frequently pay more for the same training and experience than elementary positions do. It is customary to supplement the salaries provided in the schedules for special fitness or extra work. Any county or city may adopt a salary schedule in excess of the state schedule provided it follows the general principle of regulating salaries according to training and experience. Morrison found that average actual salaries exceeded the state minimum by $10.06 per month for elementary white teachers and by $25.87 per month for white high school teachers. For all teachers of all classes the actual salaries paid were 12.4 per cent higher than the state schedule. From this he concludes that the present salary schedule ought to be revised upward.[17]

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[14] See page 69 for complete explanation.

[15] Morrison, F. W. *Equalization of the Financial Burden of Education Among Counties in North Carolina*, pp. 26-29, 60.

[16] *The Public School Law of North Carolina* (Codification of 1923). State Superintendent of Public Instruction, Raleigh, N. C. Section 176 provides that teachers shall be allowed in proportion to average daily attendance and prescribes the number of children in average daily attendance required for a teacher to be allowed.

The outcomes of this study show that in 1923-24 the factors significant in determining the distribution of trained teachers in the state were: (1) actual monthly salary; (2) length of term; (3) size of the school; (4) local initiative in excess of the minimum state program. A general knowledge of the status of school conditions in the state as to the factors involved will aid in the understanding and interpretation of the study. The following pages will give some general facts as to the status of significant factors.

TRAINING OF RURAL TEACHERS[18]

Based on an index representing the number of years' training above elementary school graduation, the counties of the state varied widely in the scholastic training of their teachers. The county having the best-trained rural teachers had an index of 656. This means that the average teacher in that county had the equivalent of two and one-half years of college training. The county having the poorest-trained teachers in its rural schools had an index of 371, which means that the average teacher in that county had less than high school training. The rural teachers of the whole state (high school and elementary) show an average index of 475, about three-fourths of a year of college training. From the types of certificates held by teachers in the rural elementary white schools in 1923-1924, the average index of training was calculated. This was found to be 433 which means that the typical teacher in this class of schools had about one-third of a year of college training.[19] A more accurate average index of training for this class of schools was yielded by the data gathered for this study. This index (410) shows that the average teacher in the rural elementary white schools had slightly more than a high school education in 1923-1924.

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[17] Morrison, F. W. *Equalization of the Financial Burden of Education in North Carolina*, pp. 79-82.

[18] *State School Facts*, Vol. 1, No. 2, State Superintendent of Public Instruction, Raleigh, N. C., 1924.

ACTUAL MONTHLY SALARIES OF WHITE RURAL ELEMENTARY TEACHERS

The amounts by which actual salaries exceed the state salary schedule were given above. The average actual salaries vary by counties from $90.71 per month to $73.68. If the school were taken as the unit this variation would be much increased. The average salary paid to rural white elementary teachers was $85.12 per month in 1923-1924,[20] with the county considered as a unit. The material gathered for this study shows that the mean salary is about $80.00 per month when the school is taken as a unit.

LENGTH OF TERM

In 1918 an amendment to the state constitution required that all schools run for at least six months. Counties or districts may conduct their schools for longer terms by means of local taxes. Many schools run for only the minimum term of one hundred and twenty days. The data gathered for this study indicate that for various reasons about 3 per cent of the schools failed to complete the minimum constitutional term in 1923-1924. One county in the state ran all of its rural schools for one hundred and eighty days and the shortest term county had an average of one hundred and twenty-two days. The mean length of term for all the elementary rural schools was about one hundred and thirty-five days when the individual school was taken as the unit. With the county as a unit the average term was about one hundred and thirty-one days.

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[19] *Biennial Report, 1922-1923* and *1923-1924*, p. 214, Table XV. State Superintendent of Public Instruction, Raleigh, N. C.

[20] *State School Facts*, Vol. 1, No. 6. State Superintendent of Public Instruction, Raleigh, N. C.

SIZE OF SCHOOLS AS SHOWN BY NUMBER OF TEACHERS IN A SCHOOL

Some indication of the prevalence of one-teacher schools in the state is shown by the fact that out of a total of 12,415 rural teachers in the white schools of the state, 1,595 or about 13 per cent worked in one-teacher schools in 1923-1924.[21] About 2,500 of the teachers in the rural schools held positions where they taught only one grade. Out of an approximate total of 4,500 white elementary rural schools varying in size from one to thirty teachers, one-third was of the one-teacher variety. The typical rural school as shown by the mean had three elementary teachers; as expressed by the median, it had only two teachers. Three-fourths of the schools in this group are of the one-, two-, and three-teacher variety; however, school consolidation is rapidly increasing the number of large schools.

LOCAL INITIATIVE IN PROVIDING EXTRA TEACHERS, A LONGER TERM, AND EXTRA SALARY

The fourth factor which was found to be significant in this study is really a combination of the other three expressed by a single measure of local initiative in providing an educational program in excess of the state minimum requirements. A detailed exposition of the derivation of this measure is given in Chapter V.[22] Answers to two questions will furnish the general knowledge necessary to an understanding of the nature and extent of this extra program: (1) How are funds for defraying the expenses of this excess program raised? (2) In what ways may these funds be expended?

The state school law provides for the following local tax units for support of elementary schools:[23] (1) local tax districts, usually created for the support of a single school; (2) special charter districts, generally used for support of schools in an incorporated town or city; (3) special school taxing district, a territorial division of a county embracing more than one school district in which special taxes for schools may be voted; (4) the county unit, where all the property of a county is taxed for support of schools. The county unit, supplemented by appropriations from the state equalization fund, is the basis for support of the minimum state program; but an additional county-wide tax may be voted for supplementing this minimum program. Two counties in the state, New Hanover and Wilson counties, had voted county-wide special taxes prior to 1923-1924.

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[21] *Ibid.*, No. 4.

[22] See page 72.

[23] *The Public School Law of North Carolina* (Codification of 1923). Part VII; also p. 6. State Superintendent of Public Instruction, Raleigh, N. C.

For the purposes of this study three ways of using local tax funds are important: (1) they may be used to lengthen the school term beyond the constitutional minimum of six months; (2) teachers' salaries in excess of the minimum schedule may be paid from local tax funds; (3) more teachers than are permitted by the state scheme of apportionment may be employed.

The extent to which the term has been lengthened through local initiative is shown by the facts on length of term quoted above. Since the state constitution requires only one hundred and twenty days, and the average length of term in 1923-1924 for the white elementary school was about one hundred and thirty days, it is evident that local funds were used to extend the average length of the term ten days. It has been estimated that over two thousand schools (rural and city local tax and special charter) raised over $2,000,000 in 1923-24 with which to extend their terms beyond the required six months' term.[24]

The facts in regard to teachers' salaries in excess of the schedule have been given. The difference of $10.06 per month between the average actual salary of white elementary teachers in the rural schools and the average salary which such teachers would draw if the minimum schedule were followed is paid by some form of local taxation. In several counties there is a county-wide salary schedule which is higher than that provided by the state, but in most instances the excess salary is paid out of funds raised within small local tax districts. Much of the funds raised by local initiative are used to supplement the minimum salary.

The employment of extra teachers is another aspect of local initiative. The state school law regulates the number of teachers allowed in accordance with average daily attendance.[25] The equalizing fund for teachers' salaries is apportioned to legal teachers as justified by the average daily attendance for the previous year. The salaries of extra teachers beyond this uniform state-wide apportionment must be paid entirely from local funds. *State School Facts,* Vol. 1, No. 15 (November 15, 1924), gives for each county in the state the number of teachers employed and the number permitted according to the state program. This summary shows that in only four counties out of the total of one hundred was the state minimum apportionment of teachers followed exactly. A large number of counties had only one, two, or three extra-legal teachers. One county employed two hundred and fifty-six teachers when the state basis allowed only one hundred and eighty-eight, an excess of fifty-six teachers. Another county had 40 per cent more teachers than it would be allowed under the state apportionment. When the school is taken as the unit of study, it is found that the large majority of the elementary white rural schools have no more teachers than their average daily attendance will justify under the law. Of the 1,393 schools used as a basis for this study, some had twice as many teachers as the legal basis would provide; for instance, there was one ten-teacher school which was entitled to only five teachers on the state basis. It is probable that these extra teachers in a school tend to make positions in that school more attractive to trained teachers because of the smaller number of children and the fewer grades which have to be taught by each teacher.

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[24] *State School Facts.* Vol. 1, No. 10, February 1, 1925, State Superintendent of Public Instruction, Raleigh, N. C.

[25] *The Public School Law of North Carolina* (Codification of 1923), p. 45. State Superintendent of Public Instruction, Raleigh, N. C. Also see page 72.

CHAPTER III

FINDINGS OF THE STUDY

In the two preceding chapters the purpose has been to give the reader the general information needed for an understanding of the nature of the problem considered in this study and the knowledge of school conditions in North Carolina which will help toward interpreting the findings of this investigation. In this chapter the actual findings of the study are presented. The detailed exposition of the techniques used is reserved for Chapter IV. A complete description of preliminary experimentation, the meaning and derivation of measures will be found in Chapter V. Throughout the study the variables used are given the numbers 1 to 11 as shown in the following paragraph. The technically trained student might prefer to read the material on the derivation of Variables 1, 2, 3, 4, 6, and 7 as given in Chapter V before reading this chapter. For the sake of the average reader treatment of the technical detail is placed in the two chapters following this one.

MEASURES USED IN THE FINAL EXPERIMENT

In the final experiment to determine significant factors the following measures were used:

Variable 1. Training of the Teacher
Variable 2. Monthly Salary under State Salary Schedule
Variable 3. Actual Salary per Month
Variable 4. Excess per Legal Teacher—A Measure of Local Initiative
Variable 5. Percentage of Enrollment in Average Daily Attendance
Variable 6. Number of Elementary Teachers in the School
Variable 7. Length of Term in Days
Variable 8. An Index of Economic Ability
Variable 9. Percentage of Native White Illiteracy

Variable 10. Density of Population as Shown by Rural White Population to the Square Mile
Variable 11. Localized Effect of Teacher Training Institutions

A detailed explanation of the nature and derivation of each of these measures is given in Chapter V. For the purpose of this chapter, viz., to explain in general the outcomes of the study, the following explanation will be sufficient. For Variables 1 through 7 above, statistical measures were derived for 1,393 schools in thirty counties of North Carolina; for Variables 8 through 11, it was impossible to get measures for each individual school, but average measures representing each of the thirty counties were obtained for each of these county-wide factors. This average measure was used as the measure of the factor for each school in the county. A detailed explanation of the use of Variable 8 will make this point clear.

The scheme of school support in North Carolina places most of the responsibility for carrying out the minimum program of the state on the individual counties of the state. The schools in the thirty counties studied varied greatly in progressiveness; these counties also varied tremendously in wealth. It seemed logical that this difference in economic ability might affect the progressiveness in the schools in the various counties and that economic wealth might be a fundamental factor in causing well-trained teachers to go to one county and poorly-trained teachers to another. But it would be useless to get a measure of the economic ability of each school district, because the state minimum program is supported not by the wealth of each district, but by all the taxable property in the county; hence, the economic ability of the *whole* county (when properly weighted to remove extraneous factors) becomes the best indication of the wealth back of every school in that county. For these reasons the measure of economic ability was identical for all the schools in a given county.

In the case of Variable 8, the county-wide measure was the logical one to use; but in the case of the others (9, 10, 11) the use of an average measure for each county rather than an exact measure for each school was based on expediency. For instance, it would have been desirable to know the percentage of illiteracy in each school district; if these data had been available they would have been a very accurate measure of certain social conditions which probably affect the distribution of trained teachers. Since no statistics as to illiteracy in school districts were available, the percentage of illiteracy in the county had to be used as a general indication of conditions in all the districts in that county. If it had been possible to obtain measures for each individual school for Variables 9, 10, and 11, the coefficients of correlation between training of teachers and these factors would

TABLE II

RAW CORRELATIONS OF FACTORS

This table should be read as follows: The correlation between Variable 1 (Training of Teachers) and Variable 3 (Actual Monthly Salary) is .84. The P.E. of this r is .01.

	1	2	3	4	5	6	7	8	9	10	11
r	1	.88	.84	.52	.16	.49	.52	.36	—.22	.18	.35
P.E.		.00	.01	.01	.02	.01	.01	.02	.02	.02	.02
r	2		.91								
P.E.			.00								
r	3			.64	.14	.45	.51	.43	—.19	.22	.42
P.E.				.01	.02	.01	.01	.01	.02	.02	.01
r	4				.11	.54	.78	.53	—.24	.18	.49
P.E.					.02	.01	.01	.01	.02	.02	.01
r	5					.19	.17	—.02	—.17	—.17	.03
P.E.						.02	.02	.02	.02	.02	.02
r	6						.57	.20	—.05	.18	.21
P.E.							.01	.02	.02	.02	.02
r	7							.43	—.28	.15	.33
P.E.								.01	.02	.02	.02
r	8								—.52	.30	.74
P.E.									.09	.11	.06
r	9									.22	.29
P.E.										.12	.11
r	10										.23
P.E.											.12
r	11										
P.E.											

Note: The inter-correlations of Variables 8 to 11 (inclusive) have large P.E.'s because the number of cases is small. These are county average measures, and $N = 30$.

All P.E.'s are read from Toops-Miner Table of P.E.'s, *Journal of Educational Research,* January, 1924.

have been higher, and the results of this study would have been more valid.

CORRELATIONS BETWEEN VARIABLES

Several factors in addition to the eleven given above were considered but these were shown to be unimportant in the preliminary experimentation (see Chapter V) and were not used in the final work. The correlations and inter-correlations of the variables are given in Table II. The numbers increasing from left to right and from top to bottom indicate the measures listed at the beginning of this chapter. It will be noted that only two correlation coefficients are given for Variable 2 (Monthly Salary under State Salary Schedule). This variable was considered as an alternate criterion with Variable 1 (Index of Training). An examination of the state salary schedule[1] will show that the monthly salary under this schedule is itself a fairly good index of the preparation of the teacher since it varies with experience and training. Further reasons for including this single correlation will be given.

SIGNIFICANCE OF FACTORS STUDIED

The first question that arises in relation to the factors studied is this: How significant are these measures in their effect on the distribution of trained teachers? The multiple coefficient of correlation $R_{1.3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\ 11}$ (meaning the correlation of training with a combination of all the other measures except 2) would give the answer to this question.

In Chapter IV below, explanation is given of the formula which enables us to find the highest possible multiple R by a short method, and to learn the relative importance of the various factors at the same time. The use of this formula reveals that the highest multiple correlation and the best possible combination of the factors is .86. As a multiple R approaches 1.00, it shows that the factors combined are significant; as it approaches 0, it indicates that significant factors have not been included. This multiple R (.86) shows that the factors studied affect significantly the distribution of trained teachers.

A second question related to the one answered above is: What is the relative importance of the various factors in predicting the training of teachers? The highest multiple correlation between training of teachers and the factors studied is obtained when Variables 3, 6, 4, and 7 are combined. ($R_{1.3647} = .86$). By including any of the other factors this multiple correlation can be raised only a few thousandths. This indicates that the average actual salary per month, the number of elementary teachers in the school, local initiative, and length of term when combined together outweigh the other factors. It does not mean that the other factors are not important. For instance, $R_{1.7\ 6\ 11\ 9\ 3} = .85$. This shows that other combinations of the factors will yield a high multiple correlation. However, when we have found the combination which yields the highest possible multiple correlation with the criterion (in this case, the training of the teachers) we may conclude that the factors giving the highest possible multiple R include the others because of the inter-correlations among factors.

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[1] See page 15.

PREPONDERANCE OF MONTHLY SALARY AS A FACTOR

The use of the partial correlation technique proves that salary has more effect on the training of teachers than does any of the other factors. The raw correlation of salary with the index of training is $.84 \pm .01$. This coefficient of correlation is high for data of this kind. No other factor studied has as high a raw correlation with training. (See Table II. It must be remembered that Variable 2 is an alternate criterion and not one of the factors actually operative.) The partial correlation of training with salary when other significant factors are held constant ($r_{13.467}$) is .78. This coefficient tells us that the relationship between the training of the teacher and the salary is very close even when the effect of local initiative, size of school as measured by the number of elementary teachers, and length of term is removed by holding these three factors constant. This leads us to conclude that in North Carolina monthly salary is an outstanding factor in determining the distribution of training in the state.

EFFECTIVENESS OF THE SALARY SCHEDULE IN OPERATION

How effectively has the minimum salary schedule worked in practice in North Carolina? To answer this question it is first necessary to know what would be the correlation between training and salary if the schedule were used universally in the rural white elementary schools both as a maximum and a minimum salary. In other words, what is the theoretical relationship between salary and training which the schedule undertakes to set up. Table II shows that the correlation between training of the teachers (1) and monthly salary under the state salary schedule (2) is .88 ± .00. This fact must be kept in mind: the state salary schedule is a minimum basis, but does not determine the total salary in every instance because a monthly excess may be paid, and this excess does not always vary with the training of the teacher.[2] The above correlation between training and the monthly salary which the teacher would draw if the schedule were universally followed (.88) shows the extent to which the state department of education intended that training should be related to salary when the schedule was adopted. The correlations between the Training of Teachers (1) and Actual Monthly Salary (3) is .84 ± .01. This indicates that although this monthly excess paid in addition to the minimum schedule is probably not regulated in accordance with training to the same degree as is contemplated in the basic salary schedule, the correlation between actual salary and training remains high.

Another indication of the effectiveness of the salary schedule in operation is shown by the correlation between the average salaries under the state salary schedule and the actual salary per month ($r_{23} = .91 \pm .00$). If the various items which influence the amount of a teacher's salary, such as personality, experience, training, efficiency, and cost of living, were weighted in the same proportion in practice as they are in the minimum schedule, the correlation between the salary under the schedule and salaries actually paid would be perfect (1.00). The fact that r_{23} is so nearly a perfect correlation shows that in practice the requirements of the salary schedule are rather closely followed.

The facts that r_{13} and r_{12} are so nearly equal and that r_{23} is a high correlation enables us to draw the following conclusions: North Carolina has been able (by setting up a minimum basic salary and controlling certification in terms of training) to regulate salaries in the elementary schools according to the training of the teacher. The extent to which this has been accomplished can be judged by comparing the correlation between training and salary in North Carolina with the correlation between training and salary in Mississippi, where such definite regulation of salaries according to training is not required by a state law. These two states are sufficiently similar in respects other than the one factor of salary and certification legislation to warrant the use of Mississippi as a control state. In 1921 Ivy found that the correlation between monthly salary of women teachers in the rural schools of Mississippi and their training was .3828 ± .026.[3] Since almost all of the elementary teachers in the rural schools are women, the coefficient found by Ivy may be compared with the coefficient between salary and training found in this study ($r_{13} = .84 \pm .01$). In so far as other significant factors are equal in the two states, the lowness of the correlation between salary and training in Mississippi and the highness of the correlation between salary and training in North Carolina may be accounted for by the fact that North Carolina has a scheme which undertakes to make the salary proportionate to training and that Mississippi had no such scheme at the time of Ivy's investigation.

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[2] See pages 17 and 18.

FACTORS AFFECTING THE DISTRIBUTION OF TRAINED TEACHERS

This study gives a partial answer to this question: When monthly salary is closely coördinated with training throughout a state, what conditions other than monthly salary attract trained teachers or what conditions repel trained teachers when salary per month is the same? It was shown above that the operation of the salary and certification laws in the state has made it possible for a teacher with a specified amount of training to get approximately the same salary per month regardless of the conditions surrounding the school in which she might work. The basic salary is the same for teachers in high school and elementary grades. The only factor that hinders absolute equalization of monthly salary is the monthly excess, and it has been shown that in the rural elementary schools this causes only a small decrease in the crude correlation between salary and training (from .88 ± .00 to .84 ± .01; r between state salary schedule and training is .88 ± .00; r between actual salary and training is .84 ± .01). But there are factors other than monthly salary that attract trained teachers or, in other words, buy trained teachers. The results of this study show that trained teachers tend to go to schools which have longer terms, more teachers, and to communities which show the greatest amount of local initiative in providing a program in excess of the minimum required by the state. It was shown above that these four factors (monthly salary, size of school, length of term and local initiative) were those of major importance and include the other factors for which measures were obtained. The crude correlations between these factors and training are (see Table II):

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[3] Ivy, H. M. *What is the Relation of Academic Preparation, Experience, Intelligence, Achievement, and Sex of Rural Teachers in Mississippi to Their Pay?* p. 31, 1922.

r between training and actual monthly salary (r_{13}) $= .84 \pm .01$
r between training and measure of local initiative (r_{14}) $= .52 \pm .01$
r between training and size of school (number of teachers) (r_{16}) $= .49 \pm .01$
r between training and length of term (r_{17}) $= .52 \pm .01$

If the yearly salary of the teacher be considered as one factor it is evident that salary per year is the one outstanding factor in determining the distribution of trained teachers, since the two factors (length of term and monthly salary) making up yearly salary have the highest crude correlations with training.

It is desirable to know what effect each of these factors has on the distribution of trained teachers when the other factors are held constant. Table III shows these facts.

TABLE III

PARTIAL R'S BETWEEN TRAINING OF THE TEACHER AND OTHER SIGNIFICANT FACTORS

Variable 1 = Training of the Teacher
Variable 3 = Average Actual Salary per Month
Variable 4 = Excess per Legal Teacher, a Measure of Local Initiative
Variable 6 = Number of Teachers, a Measure of the Size of the School
Variable 7 = Length of Term
$r^*_{13.467} = .78$
$r_{14.367} = -.27$
$r_{16.347} = .20$
$r_{17.346} = .25$

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*$r_{13.467}$ means the correlation between training and average actual salary per month when the other factors are held constant.

SIGNIFICANCE OF PARTIAL CORRELATION COEFFICIENTS

The most significant conclusions which can be drawn from the above table is that salary per month is the most important factor in the distribution of trained teachers. The fact that $r_{13.467}$ is high as compared with the other partial r's warrants this conclusion. When Variables 4, 6, 7 are held constant, any correlation between training and salary must be due mainly to the operation of the state minimum salary schedule, due to the fact that the influence of other factors which affect the distribution of trained teachers has been eliminated. The fact that the crude r_{13} (.84) is reduced by only a small amount when the other factors are held constant proves that the monthly salary is the outstanding factor in determining the distribution of training.

SALARY SCHEDULE AND IMPROVEMENT IN TRAINING OF TEACHERS

The above conclusion raises a very significant question: Have the salary and certification schemes adopted in North Carolina tended to improve the training of the teachers in the elementary schools? It is impossible to prove that this is the case because of the large number of factors which have not been considered; for instance, in order to prove that the salary schedule was a cause of improvement in the training of the teachers, it would be necessary to show that the actual amount of the salary was such that it attracted trained workers from other lines of occupation which are in competition with teaching. Although the salary schedule was adopted in order to hold teachers who had been leaving the schools in large numbers for other lines of work, no absolute proof can be presented to show that the amounts of salaries were high enough to attract and retain workers who might have gone into other occupations. Some evidence is at hand, however, which indicates that the salaries paid in the elementary schools in North Carolina have attracted well-trained teachers who were working in other types of schools in the state, or who were employed outside of the state, into elementary school positions.

It has been shown above that monthly salary is the single outstanding factor in getting trained teachers. Salary per month was found to be a more important consideration in attracting a teacher of good training than is the length of the term, the size of the school, the type of the community, or any of the other factors considered in this study. This was shown by the fact that the correlation between salary and training "stands up" when the other factors are held constant ($r_{13.467} = .78$). The state salary schedule, then, has provided a fairly adequate salary per month which really buys the important qualification of training in the teacher.

ACTUAL IMPROVEMENT IN THE TRAINING OF TEACHERS IN NORTH CAROLINA

Next we shall consider the improvement which has taken place in the training of the teachers in the state since the adoption of the salary and certification scheme. Table IV gives the facts as to the types of certificates held by teachers in the rural elementary, city elementary, and all of the high schools for the white race for the years since the adoption of the state minimum salary schedule.[4]

TABLE IV A

TEACHERS IN RURAL ELEMENTARY WHITE SCHOOLS

TYPES OF CERTIFICATES	TRAINING VALUE	YEARS			
		1921-22	1922-23	1923-24	1924-25
Third Grade County	1	2			
Second Grade County	2	1,462	825	536	427
Provisional A, Provisional B, Temporary	3	1,368	1,774	1,693	1,226
Provisional Elementary, Elementary B	4	5,173	4,999	4,907	4,758
Elementary A	5	678	800	1,025	1,483
Primary, Grammar Grade, High School, Class C	6	1,352	1,393	1,402	1,374
Primary, Grammar Grade, High School, Class B	7	299	400	596	807
Primary, Grammar Grade, High School, Class A, High School Principal	8	105	120	144	186
Total		10,439	10,311	10,300	10,261
Index of Training		403.8	417.8	433.4	451.8

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[4] The statistics for Tables IV A, B, C, are taken from: *Biennial Report, 1922-1924; 1918-1922.* Superintendent of Public Instruction, Raleigh, N. C. *State School Facts,* 1924-1925.

TABLES IV A, IV B, AND IV C

These tables show types of certificates for each year since the adoption of the state salary schedule. The index of training in the bottom line of each table is calculated as follows: Multiply the training value of each type of certificate as given in the second column by the number of teachers holding that type of certificate. Add these products to get the total number of years training for all teachers. Divide the sum by the number of teachers to get the average index of training. The index of training given here is comparable to that used throughout this study.

The bottom line in Table IV A and in each of the following tables should be interpreted as follows: In 1921-1922 the average teacher in the rural elementary schools had a training index of 403.8, the approximate equivalent of a high school education; by 1922-23 this index had increased to 417.4, an average increase of about one-seventh of a year. The total increase for the three-year period was about one-half year of training, etc.

TABLE IV B

TEACHERS IN CITY ELEMENTARY WHITE SCHOOLS

TYPES OF CERTIFICATES	TRAINING VALUE	YEARS			
		1921-22	1922-23	1923-24	1924-25
Third Grade County	1				
Second Grade County	2	40	33	41	60
Provisional A, Provisional B, Temporary	3	15	13	11	7
Provisional Elementary, Elementary B	4	350	316	240	194
Elementary A	5	209	209	212	248
Primary, Grammar Grade, High School, Class C	6	759	790	747	665
Primary, Grammar Grade, High School, Class B	7	355	420	523	659
Primary, Grammar Grade, High School, Class A, High School Principal	8	431	540	604	632
Total		2,159	2,321	2,378	2,465
Index of Training		604.8	621.0	635.4	641.6

TABLE IV C

TEACHERS IN THE WHITE HIGH SCHOOLS, CITY, AND RURAL

TYPES OF CERTIFICATES	TRAINING VALUE	YEARS			
		1921-22	1922-23	1923-24	1924-25
Third Grade County	1				
Second Grade County	2				
Provisional A, Provisional B, Temporary	3				
Provisional Elementary, Elementary B	4				
Elementary A	5				
Primary, Grammar Grade, High School, Class C	6	548	684	693	804
Primary, Grammar Grade, High School, Class B	7	234	450	629	724
Primary, Grammar Grade, High School, Class A, High School Principal	8	1,585	1,701	2,000	2,505
Total		2,367	2,835	3,322	4,033
Index of Training		743.8	735.9	739.3	742.2

EFFECT OF THE SALARY SCHEDULE ON THE TRAINING OF TEACHERS

In discussing the effect of the salary schedule on the training of rural elementary teachers, it must be remembered that the basic schedule followed the so-called single salary principle—that is, a teacher's basic salary is the same regardless of whether she works in the elementary or high school, or in the city or rural districts. The single salary principle is violated in practice by the supplements which are paid in addition to the state schedule. Through supplementing of salaries, the city schools have an advantage over the elementary schools in salaries actually paid. Also standardization requirements force the high schools to set a higher minimum level of training than the elementary schools. An inspection of the Index of Training for the various types of schools (last line of Table IV) shows the effects of various factors which have fixed different levels of training for the various types of schools. The average teacher in the rural elementary schools has little more than high school training (400 marks graduation from high school, four years above completion of the elementary grades). The average city elementary teacher has something above two years of college training (600 means six years of training beyond elementary grades or two years above high school graduation). The average high school teacher in the state has around three and one-half years of college training (Index 743.8, meaning 7.44 years above elementary grades or 3.44 years of college training).

A comparison of the indices of training for the three classes of schools shown in Table IV for the four-year period (1921-1925) reveals the following general trends: the training of the average rural elementary teacher has increased during this period almost one-half of a year (from 403.8 to 451.8, exactly .48 of a year); the training of the city elementary teacher has increased during the period from an index of 604.8 to 641.6, about one-third of a year's training; the training of the high school teachers (city and rural) has not improved during this period, the index being 743.8 in 1921-1922 and 742.2 in 1924-1925. There was a slight decrease in the training of high school teachers after the adoption of the salary schedule.

In view of the fact that salary seems to be the most significant factor in attracting teachers to elementary schools, the trends in training for the various types of schools shown in Table IV become very significant. Following the adoption of a schedule which guaranteed the same basic salary regardless of the class of school (rural or city, elementary or high school) in which the teacher accepts work, we find that over a period of four years both rural and city elementary teachers have improved steadily in training, but that the high school teachers have shown no improvement. It seems probable that the single salary feature of the North Carolina law is doing something to remove the "invidious distinction" which has long existed between the status of the elementary teacher and the high school teacher.

TRAINED TEACHERS ATTRACTED FROM NEIGHBORING STATES

Another indication that the salary schedule as adopted in North Carolina has improved the training of the teachers is found in the large number of teachers from neighboring states who were working in North Carolina in 1924-1925. In connection with another phase of this study the sources of trained teachers for the schools of the state were found.[5]

The following technique was used. From the files of the state department of certification showing the teachers employed in 1924-25, a random sampling of 2,000 graduates of higher institutions was made. This number represents about 20 per cent of the total number of graduates of institutions above the high school level actually teaching in 1924-1925. Out of these 2,000 college graduates, a total of 747 had been graduated from institutions outside of North Carolina, and practically all of the 747 teachers came from the states adjacent to North Carolina. Thus it is evident that more than one-third of the college graduates teaching in North Carolina have been trained outside of the state. Estimating that about 50 per cent of the total number of white teachers in the state are graduates of some higher institution (either junior college, senior college or normal school) it is clear that an unusually large percentage of the well-trained teachers in North Carolina have received the training on which they were certificated at institutions located outside of the state. Statistics indicate that about 40 per cent of these trained teachers from outside the state teach in the elementary schools and that about 60 per cent are employed in the high schools. Although the presence of such a large proportion of teachers trained in neighboring states (most of these outside-of-the-state teachers are from South Carolina and Virginia) may be the result of a number of circumstances, it is probable that the difference in the level of salaries in North Carolina is a contributing cause. The fact that 40 per cent of these outside-of-the-state teachers are working in the elementary schools indicates that the single salary schedule might have had some effect upon equalizing the training of the teachers of the elementary and high schools. Out of the 2,000 college graduates tabulated for this phase of the study about 35 per cent were working in the elementary grades and 65 per cent in the high school.

A former state superintendent of schools has expressed the opinion that the improvement in the training of teachers in the state—and especially the improved status of the elementary teacher—has been "caused by the promise given the teachers that if they would improve their efficiency they would be rewarded and that a difference would be made between qualified and unqualified teachers. In order to give them an opportunity to improve themselves, the state has provided numerous summer schools running from six to twelve weeks.''[6] The statistics of summer school attendance show that there has been an exceptional ambition on the part of teachers to improve their training.[7] The facts presented above do not prove that the state minimum salary schedule with its single salary feature has improved the training of the elementary teacher but it establishes a probability that the opinion of Dr. E. C. Brooks as quoted above is justified by the facts. The data which have been given suggest the possibility of a study, conducted from another angle, to find just to what extent improvement of the training of the elementary teacher has been due to the salary schedule and the certification scheme adopted in 1920. An intensive study of the output of a number of the institutions which train teachers in North Carolina will probably show that a much larger percentage of the graduates of these institutions are entering the elementary schools than was the case prior to 1920.[8] Such data would prove the effectiveness of the single salary feature of the North Carolina salary schedule.

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[5] See pages 82 ff.

SALARY SCHEDULE AS A MEASURE OF EDUCATIONAL NEED

The present equalization fund is apportioned according to the educational burden of each county as shown by the cost of teachers' salaries under the state salary schedule for teachers allowed for six months.[9] Morrison recommends in his study of the equalization fund that the state minimum salary schedule continue as the measure of educational need for distribution of the equalization fund. A theoretical objection may be raised to the use of teachers' salaries according to the schedule as a measure of educational need in that the total cost of teachers' salaries in a given county varies with the educational effort of that county. For instance, a system of schools which has high standards of training and experience for its teachers and which attracts trained teachers by additional salary and by favorable conditions of work, increases thereby the cost of its teachers' salaries under the salary schedule which is graduated according to training and experience. When this salary schedule is used as the measure of educational need, the system having the better-trained and more experienced teachers is judged to have greater educational need than a system with poorly-trained, inexperienced teachers.[10] Other things being equal, the school system having the higher type of teachers draws more money from the equalization fund. The results of this study show that trained teachers are attracted to large schools, having long terms, and paying an excess above the minimum salary schedule, and that they tend to avoid small schools, maintained on the basis of the minimum state program as regards salaries, length of term, and number of teachers. A district that has good teachers obtains them largely through local effort as represented by a consolidated school, and various methods of expending local tax funds such as lengthening the term or paying more salary than the required minimum. The following quotations from a recent monograph by Dr. Mort state clearly the theoretical objections to including reward for effort in the measure of educational need:[11]

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[6] *Biennial Report, 1920-1922.* State Superintendent of Public Instruction, Raleigh, N. C. Educational Publication No. 61.

[7] *Biennial Reports, 1922-23, 1923-24.* Chapter IX. State Superintendent of Public Instruction, Raleigh, N. C.

[8] Dr. John H. Cook has shown in an unpublished study that this is true for the graduates of the North Carolina College for Women, Greensboro, N. C.

[9] Morrison, F. W. *Equalization of the Financial Burden of Education Among Counties in North Carolina.*

> The Educational Finance Inquiry demonstrated that whereas equalization of educational opportunity requires wealthy districts to help carry the burdens of the poorer districts, the effect of payment for effort is the reverse of this. The result of the emphasis of reward for effort in a state aid system is therefore to destroy, in some degree, the effect of provisions for equalizing educational opportunity. . . .
>
> It would seem, therefore, that in the future development of state aid systems, payment for effort would be either entirely eliminated or reduced to a minimum where the good arising from it outweighs the harm.

In Chapter VI[12] of his study, Dr. Mort discusses state support for purposes other than equalization of educational opportunity and shows that reward for effort, if it is desired, may be obtained with less inequality of burden by creating a separate fund to be used independently of the equalization fund. His argument, applied to the question of using the salary schedule as the measure of educational need in North Carolina, may be stated as follows: Districts which make a special effort to get trained and experienced teachers, other things being equal, draw more from the equalization fund because of this effort. When districts get teachers who, because of their training and experience, cost more than does the ''typical teacher'' for the state, according to the minimum program, the cost of the minimum program is increased by the amount that the six months salaries of such teachers (under the minimum schedule) exceed the schedule allowance of typical teachers. This additional burden must be borne in part by local taxation, and in part by appropriations from the equalization fund. The amount appropriated from the equalization fund to reward the effort to get teachers with more training and experience than the typical teacher for the state creates inequalities in educational opportunity.

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[10] In practice the salaries of teachers employed in 1921-1922 were added to the salaries of those employed in 1922-1923, and the average amount of these two years was used as the basis of apportionment of the equalizing fund from 1924-1926.

The Public School Law of North Carolina (Codification of 1923), p. 123. State Superintendent of Public Instruction, Raleigh, N. C.

[11] Mort, Paul R. *State Support for Public Schools.* Introduction.

[12] *Ibid.*

Mort concludes that reward for effort may be obtained with less inequality of burden by creating a separate fund rather than by combining payment for effort with equalization.[13] The advantage of this method is that the state as a whole is held responsible for a fixed amount of money to be appropriated as a reward for effort and can set up definitely the conditions under which local districts may participate in this special form of state aid.

The above mentioned theoretical objection to the use of teachers' salaries under the salary schedule as the measure of educational need is probably neutralized by the advantages of this measure. The fact that the number of teachers for whom the state will appropriate funds varies with the average daily attendance (fewer pupils in average daily attendance being required per teacher in small schools than in large ones) makes the teachers' salaries under the schedule a fairly satisfactory index of the relative cost of offering the minimum program in all communities of the state. Since education of a given quality costs more in small schools than in large ones, the equalization appropriation for teachers' salaries is based on the following standards: One teacher is allowed when the average daily attendance of a school is less than 38; two teachers, when the average is between 38 and 65; three teachers, when the average is between 65 and 100; four teachers when the average is between 100 and 135. After this, one additional teacher is allowed for every additional 35 in average daily attendance.[14] These standards give the small school an advantage over the larger ones, which compensates partly for the extra cost of education in small schools.

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[13] Mort, Paul R. *Op. cit.*, p. 40.

The determination of factors affecting the distribution of trained teachers furnishes a partial analysis of the reward for the effort factor contained in the measure of educational need in North Carolina. Since the appropriation of the equalization fund, according to teachers' salaries under the salary schedule, places a premium on getting well-trained teachers, it is important to know just what conditions help or hinder a district in attracting trained teachers. A reward for effort policy should be based on a definite knowledge of how much effort and what kind of effort is necessary to get the appropriation offered. This study shows in addition to monthly salary that the size of the school and the length of term are related to the training of the teacher. If the school has a large number of teachers and a relatively long term, teachers with higher certificates are attracted to it; if the school has few teachers and a short term, teachers with good academic training avoid this school and poorly-trained ones accept work there. In terms of the effort which a school has to make in order to get trained teachers, all of this means that it must in some instances provide a term beyond the state minimum and become a consolidated school in order to attract trained teachers. In the equalization counties, those schools having terms longer than the state minimum, and with more than the average number of teachers for the state, because of the advantage which these conditions give them in attracting trained teachers, are able to draw larger amounts from the equalization fund. This means that the state has adopted a policy of either helping the schools that help themselves, or in some instances, of giving most to those communities which have most.

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[14] *The Public School Law of North Carolina* (Codification of 1923), p. 45, Sec. 176. State Superintendent of Public Instruction, Raleigh, N. C.

The extent to which it is true that large schools with long terms tend to get better-trained teachers is shown by the partial coefficients of correlation given in this chapter.[15] A clearer idea of the weight of the various factors which affect the distribution of trained teachers is provided by the regression equation which may be obtained from these partial coefficients.[16] The regression equation, by means of which the training of the teacher may be predicted from the four factors selected as most significant, is as follows:

$$x_1 = 4.62\, x_3 + (—.19)\, x_4 + 5.48\, x_6 + 1.19\, x_7$$

Where

x_1 = the deviation of a school from the mean of the Indices of Training

x_3 = the deviation of that school from the mean Salary per Month

x_4 = the deviation of that school from the mean Excess per Legal Teacher

x_6 = the deviation of that school from the mean Number of Teachers

x_7 = the deviation of that school from the mean Length of Term

Mean of the Indices of Training = 410
Mean Salary per Month = $ 79.69
Mean Excess per Legal Teacher = 111.25
Mean Number of Teachers = 3.15
Mean Length of Term = 135.8
P.E. est. $x_1 = 35.7$

One phase of this regression equation requires an explanation. It has to do with the $(—.19)\, x_4$. This means that as the excess per legal teacher increases above the average, the training of the teacher is decreased. The fact that this regression weight is a negative quantity may be traced to the sign of the partial coefficient of correlation from which the regression weight is derived. The crude correlation between training and excess per legal teacher is .52 ($r_{14} = .52 \pm .01$). When the other three factors are rendered constant, this correlation becomes —.27 ($r_{14.367} = —.27$). This change from a positive crude correlation to a negative partial correlation is due to the fact that Variable

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[15] See page 30.

[16] For explanation of technique for obtaining regression equation, see Chapter IV.

4 is a composite measure of local initiative in which three items have been given weight, viz., the use of local funds for (1) increasing the teachers' salary beyond the state salary schedule, (2) for lengthening the school term beyond the six months' minimum, (3) for paying more teachers than the minimum program provides. The distinctive element in this particular measure evidently varies inversely with the training of the teacher.[17]

From the above regression equation the following conclusion may be drawn: The use of the training of the teacher, employed as one element in the measure of educational need, (the other element is the experience of the teacher,) places too much emphasis on reward for effort in the equalization program of the state.

A more complete statement of this conclusion is as follows: The present measure of educational need places too much emphasis on reward for effort because the main item in that measure, viz., the training of the teacher, varies with the effort of the local community as represented in the salary paid the teacher, the length of term provided and the size of the school. The training of the teacher varies inversely with the excess salary per legal teacher when the other three factors are rendered constant.

The above conclusion is subject to two limitations:

(1) The P.E. of Estimate of the regression equation is 35.7. A hypothetical case will illustrate the meaning of this P.E. Suppose we were to substitute such values in the regression equation as would give a prediction of 400 for the index of training in a given school. (Such an index would signify that the average teacher in that school had four years of training above elementary school graduation; an index of 500 indicates one year of college work; 600, two years above high school and so on to 800, which indicates college graduation.) P.E. est. x_1 means that the chances are even, 50 in 100, that the true index of training for that school is not less than 364 (400 — 36), nor

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[17] The partial correlation coefficients in this study should be interpreted in accordance with the following quotation: "In partial correlation the true measure of contribution of a cause to an effect is mutilated if we have rendered constant variables which may in part or in whole be caused by either of the two factors whose true relationship is to be measured, or by still other unmeasured remote causes which also affect either of the two isolated factors."

Burks, Barbara S. "On the Inadequacy of the Partial and Multiple Correlation Techniques." *Journal of Educational Psychology,* Vol. 17, p. 539.

more than 436 (400 + 36). The high error of estimate is due to the fact that not all factors affecting the distribution of trained teachers were included in the study.

(2) The second limitation to the above conclusion arises from the fact that training is not the only qualification recognized under the salary schedule which is used as the measure of educational need. Experience up to four years is the other element which determines salaries under the schedule. An examination of the salary schedule (see Table I) shows that training receives much more recognition than experience. No credit is given for experience on certificates below standard; the usual increase allowed for a year's experience is $5.00 on the monthly salary, whereas an increase of $10.00 or more per month is allowed for each year of training. Eight levels of training are given recognition while no increase in salary is allowed for experience beyond the fourth year. These facts justify the assumption that training is the main element in the salary schedule and show that the second limitation to our conclusion does not seriously affect its validity.

Morrison found that the average salary of teachers in non-equalizing counties was 10.44 per cent higher than in those counties which draw from the equalization fund.[18] In 1922-1923 the average index of training for all teachers in the state was 462. The sixty-eight counties which draw from the equalizing fund had an average index of 444. The thirty-two counties which did not draw from the equalizing fund had an index of 494. This means that on the average the teachers in equalizing fund counties had one-half of a year less training than did those in the non-equalizing fund counties. These conditions illustrate the conclusion which was drawn from the regression equation yielded by this study. The poorer counties of the state (those which draw from the equalizing fund) are not able to attract well-trained teachers as do the wealthier counties because in the poorer counties are found schools with short terms, and few teachers. Moreover, in these poorer counties, teachers receive relatively low salaries. When the salary schedule is used as the measure of educational need, the counties having schools with short terms and few teachers, and offering minimum salaries, are penalized because the teachers do not rate as high in the salary schedule as the teachers do in counties where conditions are more favorable. The backward counties do not secure well-trained teachers for one of two reasons: (1) It is possible that they do not make the necessary effort as represented by the use of local tax funds for extending the term and for offering salaries above the minimum, or through promotion of school consolidation. (2) It is possible that in some cases, social, economic, and geographical conditions are such that money cannot be raised for lengthening the term and increasing salaries, and that school consolidation is not possible. To the extent that the first possibility is a fact, a sound policy of equalization would demand that the reward for effort and equalization be handled through separate funds; if the second possibility is to some extent the cause of backward conditions, the state minimum educational program should be enriched so as to remedy the conditions over which the community has no control.[19] In either case there is needed an equalization of trained teachers throughout the rural schools of the state.

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[18] Morrison, F. W. *Equalization of the Financial Burden of Education Among Counties in North Carolina*, pp. 40-44.

Should North Carolina abandon its present basis for appropriation of the equalization fund and use a measure of educational need which does not contain so much "reward for effort" put forth to attract trained and experienced teachers? It has been shown that there are theoretical arguments both for and against the use of salaries under the schedule as the measure of educational need. Morrison in his study of the equalization fund concluded that [20] "so long as the state means only partially to equalize the burden of education, the fairest measure on which to base equalization is teachers' salaries according to the state schedule." This conclusion was based on practical considerations. In the following pages recommendations will be made which will remove some of the reward for effort from the present measure of educational need. If the recommendations of this study relative to enriching the minimum state program and revising the salary schedule are combined with similar recommendations made by Morrison, many of the objections to the use of the cost of teachers' salaries under the state schedule as a measure of educational need will be removed. At least the practical advantages of using this measure will outweigh the theoretical objections to payment for effort if the present glaring inequalities are remedied by enriching the minimum state program and revising the salary schedule as is proposed in the following pages.

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[19] Mort, Paul R. *Op. cit.*, p. 8.

[20] Morrison, F. W. *Equalization of the Financial Burden of Education Among Counties in North Carolina*, Chapter V.

EQUALIZATION OF THE OPPORTUNITY OF BACKWARD DISTRICTS TO EMPLOY TRAINED TEACHERS

In the section immediately preceding this one, findings of the study were discussed as they apply to the present measure of educational need. The fact that the equalization counties having favorable school conditions in the form of high salaries, long terms, and large schools draw larger sums from the equalization fund than do those counties which have unfavorable school conditions does not create a great degree of educational inequality in the state as a whole for two reasons: (1) School conditions in the sixty-eight equalization fund counties are, as a rule, below the average for the state; (2) thirty-two counties in the state having the most favorable conditions draw nothing from the equalization fund. In all of the counties of the state, however, there are individual schools which are handicapped in their efforts to get trained teachers because these teachers tend to go to the large schools which have long terms and pay salaries beyond the minimum. It appears, then, that the question of equalizing the distribution of trained teachers is one of statewide importance. If the handicaps of the small short-term school in the matter of getting trained teachers can be removed, not only will some of the defects in the apportionment of equalization money be corrected, but better equalization of educational opportunity will also follow in all the rural schools. Since the training of the teacher is a very important factor in the type of education offered, each school should have as nearly as possible an equal opportunity to buy this essential qualification. In order to more nearly equalize the distribution of trained teachers in the state, either or both of two policies should be adopted:

I. The state may equalize these two factors by (*a*) providing a longer minimum school term; and (*b*) providing the cost of transportation for rural schools in which it is difficult to get trained teachers to accept work. This should be done by enriching the minimum state program the burden of which is to be equalized by appropriations from the state equalization fund. If the local units were compelled to bear all the expense of the lengthened term and of school consolidation, the burden of the minimum program would not be equalized.

II. The state may compensate for the unattractive features of the small short term rural school by offering additional salary to trained teachers who will accept work in such a school.

Specific recommendations based on these two policies will be made in the following pages. The recommendations are such as not to prevent the larger schools with relatively longer terms from continuing to attract trained teachers, but the purpose is to raise the level of training among the backward schools.

ENRICHMENT OF THE STATE MINIMUM PROGRAM

A study of conditions surrounding the one-teacher white schools in North Carolina reveals the fact that in 1923-24, teachers in these schools had an average training index of 363, which means that teachers in such schools have less than a high school education.[21] This is one-half year lower than the average for all the rural schools. The length of term for this type of school is only slightly above the minimum of one hundred and twenty days. These deplorable conditions illustrate the findings of this study, viz., that the correlation between training of the teacher and size of the school when other factors are rendered constant is .20 ($r_{16.347} = .20$) and the correlation between training of the teacher and length of term, other factors being rendered constant is .25 ($r_{17.346} = .25$). These correlations show that the undesirable conditions, smallness of schools, shortness of term, and poor training of teachers are frequently found together. The obvious conclusion is that such districts do not attract trained teachers because of their short terms and because of the difficulty of the work found in the small school. Such districts often lack the progressiveness, leadership, or economic ability necessary to help themselves by raising local tax funds or through participation in a consolidation scheme. Sometimes, geographical conditions are such that consolidation is impossible. Two recommendations follow from the above:

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[21] *State School Facts*, Vol. 1, No. 4. State Superintendent of Public Instruction, Raleigh, N. C., 1924.

1. The minimum state program should be enriched to provide a school term of at least one hundred and sixty days. Morrison supports a similar recommendation relative to a satisfactory state-minimum program as a basis of equalization as follows: [22]

> North Carolina is a rural state. Eighty per cent of the inhabitants live on the farm. The average length of the rural school term is but 133 days. The length of term in many rural communities is the minimum term required by the constitution—six months. The average for city and special charter schools, however, is 177 days. Most cities have a term of 180 days; a few still have only an eight months' term. In the wide difference between the length of term in city and rural schools, the present situation in North Carolina is clearly unsatisfactory. The length of the average rural term is 75 per cent the length of the average city term. Many of the rural schools —in some cases those of an entire county—have a term only 66⅔ per cent as long as the majority of the city schools.

2. The state should include in its minimum program a larger proportion of the cost of school consolidation in rural districts now having schools of less than average size (the mean number of teachers in the rural elementary schools of this study was 3.15). In the whole state, $654,644.62 was spent for operation and maintenance of trucks for transportation of school children in 1923-1924. Only $30,000 of this was paid from state funds. In Delaware, Minnesota, and Michigan, practically all of the operation and maintenance expense of transportation is paid by the state.[23] The recently enacted equalization law of New York provides that the state pay one-half the cost of transportation.[24] Other states make large appropriations for this purpose. A careful study should be made of the need for school consolidation in the rural districts, and a measure of the relative need of the various districts devised. Under present conditions in the state it seems desirable that this consolidation appropriation be handled through a fund separate from the fund now appropriated on the basis of teachers' salaries under the schedule.

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[22] Morrison, F. W. *Equalization of the Financial Burden of Education Among Counties in North Carolina,* pp. 76 and 77.

[23] *State School Facts,* Vol. 1, No. 20. State Superintendent of Public Instruction, Raleigh, N. C., 1925.

[24] Mort, Paul R. *Op. cit.,* Chapter VII.

REVISION OF THE STATE SALARY SCHEDULE

As a means of supplementing the above recommendations dealing with enrichment of the state minimum program, it is recommended that the salary schedule be revised in three respects. First, a minimum yearly salary based on eight times the monthly salary schedule should be put into effect and paid regardless of the length of term. Second, special salary schedules higher than the minimum should be provided for teachers in one-teacher schools. Third, the salary schedule for all types of rural schools should be revised upward.

The provision of a minimum yearly salary schedule is urged as an immediate solution of the problem of short term. It will require at least five years for a constitutional state-wide eight-months' term to be put into operation. The State Board of Education has the power to revise the salary schedule without delay.[25] Under the present salary schedule which provides a minimum monthly salary, the pay of the teacher varies with the length of term with the result that the short term school is at a disadvantage in getting trained teachers to the extent shown by the partial correlation between the index of training and length of term when other factors are rendered constant ($r_{17.346} = .25$). Under the present schedule a college graduate with four years of experience rates $800.00 minimum yearly salary in a six-months' school, but the same teacher is entitled to $1,200 as a minimum in a nine-months' school. It is a general practice in city schedules to put teachers' salaries on a yearly rather than a monthly basis.[26] The results of this study show that a similar policy applied to the North Carolina salary schedule would tend to attract better-trained teachers to the short-term schools. In other words, a salary schedule offering a minimum yearly pay regardless of the length of term would tend to equalize the distribution of trained teachers by absorbing the effect of Variable 7. Eight times the minimum monthly salary should be fixed as the minimum yearly salary. This would bring about a gradual extension of the term toward eight months because communities would tend to insist that the school continue as long as no additional salary was required. Since the cost of teachers' salaries under the schedule is the measure of educational need and is used as a basis for distribution of the equalization fund, this minimum yearly salary will provide greater equalization of educational opportunity by enabling the present short term schools to enter the market for trained teachers without handicap.

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[25] *The Public School Law* (Codification of 1923), Sec. 57. State Superintendent of Public Instruction, Raleigh, N. C.

[26] *Public School Salaries in 1924-1925.* Research Bulletin of the National Education Association, Vol. III, Nos. 1 and 2. January and March 1925, Washington, D. C.

The monthly salary schedule may be converted into the yearly schedule recommended by multiplying each type of salary by 8. Facts are presented below showing that the present schedule should be revised upward. This evidence should be given careful consideration before fixing the monthly salary schedule which is to be converted into a yearly salary schedule as recommended.

SPECIAL SALARY SCHEDULE FOR TEACHERS IN SMALL SCHOOLS HAVING SHORT TERMS

The most direct approach to the whole problem of equalization is to use a regression equation which may be derived, according to the method used in this study, as an instrument for devising salary schedules which will compensate for the undesirable conditions surrounding small schools having short terms by offering additional salary to teachers in those schools. The validity of using the factors found in this study as a means of predicting salaries may be determined by finding the multiple coefficient of correlation between the salary of the teacher and a combination of the other four factors, viz., Index of Training, Excess per Legal Teacher, Size of the School, and Length of Term, using the formula,

$$r_{3.1467} = \sqrt{1 - \frac{\text{S. D.}^2_{3.1467}}{\text{S. D.}^2_{3}}}$$

and substituting the following values:

$$\text{S. D.}_{3.1467} = 8.98$$
$$\text{S. D.}_{3.} = 19.10$$

we find that

$$r_{3.1467} = .88$$
$$\text{P.E. est. } x_3 = \$5.79$$

From this we may conclude that the training of the teacher, local expenditures for enriching the state program (including the length of term), and the size of the school in which the teacher works are important elements in determining actual monthly salary which she gets. The fact that $r_{3.1467}$ is not perfect (1.00) shows that some elements in determining the salary of the rural teachers in North Carolina have been omitted. One of the main factors omitted is obviously the experience of the teacher which was not included in this study.

The P.E.[27] of estimating salary from the factors named above is $5.79. The meaning of this P.E. may be explained thus: Having derived a regression equation for predicting monthly salary from the size of the school, length of term, index of training, and excess per legal teacher, this regression equation could be used for predicting the amount of salary which teachers with a given amount of training working in one-teacher schools having short terms would most probably receive; but having found by this equation that a teacher under given conditions would receive a monthly salary of, for instance, $100.00 per month, the chances would be even that this salary might be as low as $94.21 or as high as $105.79. Since the error of estimate of such a regression equation would be as large as the increment allowed in the present salary schedule for one year's experience, and one-half as large as the present allowance for a year's training (see Table I), the estimates yielded would not be sufficiently accurate to suggest salary changes. An extension of the present study in order to treat another problem—the factors affecting the salary of teachers in the rural schools of North Carolina—would yield valid data for setting up salary schedules for teachers in small schools having short terms. In such a study, at least one factor not included in this investigation would probably have to be included, viz., the experience of the teacher. Such a study would yield a regression equation for predicting the salary of the teacher from various significant factors, and this equation could be used in setting up the revised salary schedule.

The study of the factors affecting the distribution of trained teachers makes it possible to determine the most probable training of a teacher receiving the average salary, working in a one-teacher school with an average excess per legal teacher, and having the minimum length of term (120 days). Using the average salary and the average excess per legal teacher, along with the conditions surrounding the most backward type of schools, makes it possible to indicate the extent of the handicap under which the small school with a short term is placed in the matter of getting trained teachers. A concrete illustration, using the regression equation yielded by this study, will make it clear that a special salary schedule for one-teacher schools with the minimum constitutional term of six months is probably needed.

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[27] The formula for P.E. est. x_1 is given in Chapter IV. The formula used to find P. E. est. x_3 is similar.

DATA NEEDED IN ORDER TO PREDICT THE MOST PROBABLE TRAINING OF TEACHERS IN ONE-ROOM SCHOOLS WITH MINIMUM TERMS

Regression Equation in deviation form:

$$x_1 = 4.62\, x_3 + (—.19)\, x_4 + 5.48\, x_6 + 1.19\, x_7$$

Where

x_1 = Deviation from the mean of the Indices of Training
x_3 = Deviation from the mean Monthly Salary
x_4 = Deviation from the mean Excess per Legal Teacher
x_6 = Deviation from the mean Size of School
x_7 = Deviation from the mean Length of Term

M_1 (Mean Index of Training) = 410
M_3 (Mean Monthly Salary) = \$ 79.69
M_4 (Mean Excess per Legal Teacher) = \$111.25
M_6 (Mean Number of Teachers or Size of School) = 3.15
M_7 (Mean Length of Term) = 136 (days)
P.E. est. $x_1 = 35.7$

The two salary factors in the above equation are x_3 (Deviation from the mean Monthly Salary) and x_4 (Deviation from the mean Excess per Legal Teacher). Since this hypothetical school is placed at the average in the two salary factors x_1 and x_4, the deviations from the average of these two factors are both zero.

The problem which is to be solved may be stated in this form: If a school has a term of 120 days, employs one teacher, pays the average monthly salary, and has the average excess per legal teacher, how much would the training of the teacher in that school deviate from the average?

Since the average length of term is 136 days, and the average number of teachers in a school is 3.15, this school deviates from the average length of term by — 16 and from the average size of school by — 2.15. Then substituting the following values in the above equation:

$x_3 = 0$
$x_4 = 0$
$x_6 = -2.15$
$x_7 = -16$

and solving for x, we get:

$x_1 = -31$

This means that the one-teacher school with the minimum constitutional term is handicapped thereby to the extent represented by 31 index points (about one-third of a year of training), and that the most probable Index of Training for a teacher in such a school would be 379, which is below high school graduation. The fact that the P.E. of estimating x_1 from the regression equation (36 index points) is approximately equal to the handicap due to size of school and length of term (31 index points), means that the chances are about even that the one-teacher minimum term schools will get a teacher with training below the average when paying a salary equal to the average.

NECESSITY OF INCREASING SALARIES ALLOWED IN THE MINIMUM SCHEDULE

In the regression equation used in the previous section the actual monthly salary of the teacher appears as the most important factor in predicting the training of the teacher. The high correlation between training and salary, when the other factors affecting the training of the teacher are rendered constant ($r_{13.467} = .78$) shows that salary is the most important factor in the distribution of trained teachers. It was shown above that the average salary in equalizing counties was much lower than that in non-equalizing counties. This difference is partly due to the fact that the equalization counties tend to follow the minimum state salary schedule while the wealthier counties and districts pay a supplement above the salary schedule; moreover, in practically every county in the state, there are districts which because of conservatism or poverty pay only the minimum schedule. It is important to know, then, how much the salaries actually paid teachers exceed the minimum schedule and to what extent a district paying only the minimum schedule is handicapped in obtaining trained teachers.

In the following pages, by means of three regression equations derived from the data of this study, the relationship between minimum salaries and actual salaries will be shown. Two regression equations, the one for predicting training from actual salaries, the other for predicting training from state salary schedule ratings, will be used. These show that schools offering the state minimum have great difficulty in competing for trained teachers against schools paying higher salaries; a third regression equation will be used to show how much higher actual salaries are than the minimum schedule.

DATA NEEDED FOR DERIVING REGRESSION EQUATION (SCORE FORM) FOR PREDICTING TRAINING FROM ACTUAL SALARIES[28]

Let

X = Training of the Teacher, to be predicted
Y = Actual Salary per Month
r (Correlation between Training and Actual Salaries) = .84 ± 01
σ_x (Standard Deviation, Index of Training) = 105.53
σ_y (Standard Deviation, Actual Monthly Salaries) = 19.10
X' (Mean of the Indices of Training) = 410
Y' (Mean Actual Salary) = 79.69

Using the formula:

$$X = r\frac{\sigma_x}{\sigma_y}(Y - Y') + X'$$

$$X = 5.53\,Y - 50.69$$

P.E. est. $x = 11.6$

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[28] Formula from: Garrett, H. E. *Statistics in Psychology and Education,* p. 214.

DATA NEEDED FOR DERIVING REGRESSION EQUATION (SCORE FORM) FOR PREDICTING TRAINING FROM STATE SALARY SCHEDULE RATINGS

Let

X = Training of the Teacher, to be predicted
Z = Salary Rating Under Existing Schedule
r (Correlation between State Salary Rating and Training of the Teacher) = .88 ± 00
σ_x (Standard Deviation, Index of Training) = 105.53
σ_z (Standard Deviation, State Salary Schedule Rating) = 11.88
X' (Mean of the Indices of Training) = 410
Z' (Mean of the State Salary Schedule Rating) = \$72.01

$$X = r\frac{\sigma_x}{\sigma_z}(Z - Z') + X'.$$

$$X = 7.81\,Z - 152.40$$

P.E. est. $x = 10.1$

A comparison of these two equations should be made;

(1) $X = 5.53\,Y - 50.69$ (Training Predicted from Actual Salaries)
(2) $X = 7.81\,Z - 152.40$ (Training Predicted from Salary Schedule Rating)

This comparison will give an understanding of the relationship of present salaries to the minimum schedule. If the lowest salary allowed in the white schools, viz., \$45.00 per month, be substituted in the two equations, the training value predicted by each equation is approximately the index of the lowest certificate (200); but as higher salary amounts are substituted, we find a divergence in the values yielded by the two equations; for instance, an actual salary of \$100.00 substituted in equation (1) gives a training index of about 500 (one year of college training). A state salary schedule rating of \$100.00, substituted in equation (2) gives a training index of 629 (about two and one-fourth years of college training). When we remember that the salary schedule is a prescribed minimum and corresponds with actual salaries only in the backward districts in the state, and that actual salaries in many districts are in excess of the prescribed minimum, the differences between the predictions yielded by the two equations appear very significant. In terms of the \$100.00 per month salary, this divergence may be stated thus: the salary schedule contemplates that \$100.00 in salary should "buy" two and one-fourth years of college training; salaries in the rural schools have increased above the minimum to such an extent that \$100.00 will now "buy" in the open market for teachers only one year of college training. This shows how the district employing teachers at the state salary schedule rate is handicapped in comparison with the district which is able to supplement the state schedule. In actual salary it takes over \$120.00 per month to employ a teacher with the training for which the state allows \$100.00 per month.

In order to compare existing salaries with the present minimum salary schedule, a third regression equation is needed. This equation is derived as follows:

EQUATION FOR PREDICTING ACTUAL MONTHLY SALARIES FROM PRESENT SALARY SCHEDULE. DATA NEEDED

Let Y = Actual Monthly Salaries in Rural Schools
Let Z = State Salary Schedule Rating in Rural Schools

r (Correlation between State Salary Schedule Rating and Actual Monthly Salaries—r_{23}) = .91 ± 00
σ_y (Standard Deviation, Actual Monthly Salaries) = 19.10
σ_z (Standard Deviation, State Salary Schedule Rating) = 11.88
Y' (Mean of Actual Salaries) = 79.69
Z' (Mean of State Salary Rating) = 72.01

Using the formula:

$$Y = r\frac{\sigma_y}{\sigma_z}(Z - Z') + Y'$$

$$Y = 1.47\,Z - 26.16 \quad (3)$$

P.E. est. y = \$5.34

The above equation will predict the most probable Actual Monthly Salary corresponding to a given state salary schedule rating. In Table V, it has been used to predict the actual salary corresponding to the salary schedule ratings for various types of certificates. These ratings are selected from the column, Two-Years' Experience, in Table I.

TABLE V

ACTUAL MONTHLY SALARIES PREDICTED FROM STATE SALARY SCHEDULE RATINGS

STANDARD CERTIFICATES, NORTH CAROLINA SALARY SCHEDULE *	MINIMUM SALARY 2 YEARS' EXPERIENCE	CORRESPONDING ACTUAL MONTHLY SALARY, PREDICTED FROM REGRESSION EQUATION
High School		
Grammar Grade		
Primary		
Class A	$110.00	$135.54
Class B	100.00	120.84
Class C	95.00	113.49
Provisional Class C	85.00	98.79
Elementary		
Class A	85.00	98.79
Class B	75.00	84.09
Provisional Elementary	65.00	69.39

Note: The top line of this table should be interpreted as follows: To a teacher holding a High School, Grammar Grade, or Primary Class A certificate with two years' experience, the present state schedule allows a minimum salary of $110.00. Actual salaries have been raised above this amount so that the most probable actual salary of such a teacher is $135.54.

* From Table I.

A comparison of the allowance under the present schedule with the actual monthly salaries predicted from equation (3) as shown in Table V justifies the conclusion that the present salary schedule should be revised to correspond to actual salaries. Unless this is done, poorer districts which pay only the state salary schedule rating will continue to get teachers in the lower levels of training. Table V shows that the divergence between actual salaries and the present schedule is not as great in the lower levels of training as it is in the higher. This indicates that districts employing poorly-trained teachers tend to pay salaries close to the minimum schedule. A revision of the present schedule is especially important in view of the fact that the educational need of backward districts in the equalization fund counties is measured according to the cost of their teachers under the schedule and the equalization fund is apportioned accordingly. The inevitable result is poorly-trained teachers in these districts.

By means of equation (3) each amount shown on the state salary schedule (Table I) could be converted into the most probable actual salary. Thus a new salary schedule based on actual salaries could be set up. Such a schedule is not proposed in this study for two reasons: (1) only the rural elementary schools were included in the present study, and the teachers in these schools have an index of training below the average for the state; (2) an important element in salary schedules—the experience of the teacher—was not included in this investigation. The fact that the P.E. est. y from the above equation is $5.34 shows that some important factors have been omitted.

The data and method used in this study suggest a valid technique for a complete revision of the existing salary schedule. This procedure may be outlined as follows: Get data for a group of typical or average schools of the state, selecting an adequate number of all types of white schools—city, village, and rural; high school and elementary. Find the correlations and intercorrelations between experience of the teacher, monthly salary of teacher, and index of training. Set up a regression equation for predicting salary from training and experience. By means of this equation the cost of various levels of training and experience in the open market may be predicted. It will give indications of the variability in training and experience for which allowances should be made in the schedule. This "picture of present practice" should be supplemented by such principles of salary schedule construction as have been derived from the study of existing state and city schedules.[29]

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[29] Evenden, E. S. "Essential Features of a State Salary Law," *Educational Review*, October 1920. Vol. 60, No. 3.

Evenden, E. S. *Teachers' Salaries and Salary Schedules.* National Education Association, Washington, D. C., 1920.

CHAPTER IV

STATISTICAL TECHNIQUES AND FORMULÆ

The crude correlations between the criterion (training of the teacher) and the various factors in this study as well as the inter-correlations of the factors (Table II) were found by means of a modification of the formula for the Pearson Product-Moment *r*. This formula was devised by Toops, and its derivation is explained in an article by him in the *Journal of Experimental Psychology.*[1]

The formula is as follows:

$$r = \frac{\frac{n}{2}\left[(\Sigma X^2 + \Sigma Y^2) - \Sigma (X - Y)^2\right] - \Sigma X \cdot \Sigma Y}{\sqrt{n \cdot (\Sigma X^2) - (\Sigma X)^2}\ \sqrt{n \cdot (\Sigma Y^2) - (\Sigma Y)^2}}$$

where:

$r =$ product moment coefficient of correlation
$\Sigma =$ sum of
X and $Y =$ gross scores or measures
$n =$ number of cases

The derivation of this formula, together with other variations in the Product Moment Formula, is noted in a recent article by Dr. Percival M. Symonds.[2] The Toops method of finding the coefficient of correlation differs from others in two respects: (1) it assumes a mean at zero and takes all x and y deviations from this point; (2) large numbers are avoided by transmuting all original data into derived scores with a maximum of 20. The resulting coefficient of correlation is identical with that found by using other forms of the Pearson formula. Toops has published a printed form which facilitates the computation of *r* by means of this formula.[3]

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[1] Toops, Herbert A. "Eliminating the Pitfalls in Solving Correlation." *Journal of Experimental Psychology,* Vol. 4, No. 6, pp. 434-446, December 1921.

[2] Symonds, Percival M. "Variations of the Product Moment (Pearson) Coefficient." *Journal of Educational Psychology,* Vol. XVII, No. 7, October 1926, pp. 458-469.

[3] These may be obtained from H. A. Toops, Ohio State University, Columbus, Ohio, or Zaida F. Miner, Teachers College, Columbia University, New York City.

RESEARCH COUNCIL COLLECTION

After the inter-correlations of the various factors had been found, the next step was to decide which factors were significant and just how significant the factors included in the study were in the distribution of trained teachers. The answer to this problem was furnished by the multiple coefficient of correlation. In order to shorten the work at this point, the multiple ratio correlation method was used.[4] This method made it possible to find the group of factors having the most significant effect on distribution of trained teachers without trying out all the factors studied. Considering training of the teacher as the criterion to be predicted from the nine factors included in the experiment (see Table II for inter-correlation of these factors), the problem was to find the best combination of these various factors for predicting this criterion. Average actual salary per month was selected as the basic factor because it had the highest correlation with training of the teacher ($r = .84$). This, then, was selected as the most significant single factor for predicting the criterion. A special formula was then used which selects from the remaining factors those which will add most to the prediction after this most significant single factor is used as a measure of the criterion. The formula is used over and over again until the multiple coefficient of correlation is built up to the point where none of the remaining factors add anything to the combination.[5] When this point is reached it may be concluded that the effect of the remaining factors for measuring this particular criterion is used up by the factors already included in the combination.

The formula is as follows:

$$r_{IC'} = \sqrt{\frac{r^2_{IC} + r^2_{IU} - 2\,(r_{IC} \cdot r_{IU} \cdot r_{UC})}{1 - r^2_{UC}}}$$

where

$r_{IC'}$ = the multiple correlation coefficient which is built up by combination of factors
I = criterion, or training of the teacher
C = combination of factors to any point in the process
U = each new factor being considered

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[4] Soon to be published by Dr. H. A. Toops, Ohio State University, Columbus, Ohio.

[5] A similar technique using a different formula is used by Paul R. Mort, *The Measurement of Educational Need*, pp. 51-53.

Using Variable 3 (Average Actual Salary) as the basic factor and Variable 6 (Number of Teachers) as the factor to be placed in combination and selecting the coefficients of correlation needed from Table II, the formula gives the following results:

$$r_{IC'} \quad \sqrt{\frac{(.8423)^2 + (.4944)^2 - 2(.8423)(.4944)(.4535)}{1 - (.4535)^2}} = .8517$$

This indicates that the multiple correlation between the training of the teacher and a combination of Variables 6 and 3 is .8517. Repeating the use of the above formula, it was found that Variable 4 (Excess Salary per Legal Teacher) raised the total prediction to .8552, and Variable 7 (Length of Term) made the total .8605. None of the other factors made significant additions beyond this point.

Other combinations were tried, as follows, in order to determine whether another set of variables would approach the value for prediction of the chosen combination:

Starting with Variable 7 (Length of Term), as basic ($r = .5186$), adding Variable 6 (Number of Teachers), raised the correlation to .5729; adding Variable 11 (Effect of Teacher Training Institutions) made it .6008; then Variable 9 (Percentage of Illiteracy) brought the total to .6040; then adding Variable 3 to this combination brought it to .8511. Thus we see that the combination $r_{1.7\,6\,11\,9\,3} = .8511$ is one point lower than the combination explained above: $r_{1.3\,6\,4\,7} = .8605$.

The small difference between the multiple correlation coefficient yielded by these two combinations shows that factors other than the four selected (Variables 3, 4, 6, and 7) are important in determining the distribution of trained teachers; but that Variables 3, 4, 6, and 7 are most significant and the intercorrelations between them and the other factors are such that the factors selected include the effect of the other factors. On the assumption that these four factors (Actual Salary, Length of Term, Excess per Legal Teacher, and Number of Teachers) as shown by the use of the above formula, included the effect of the remaining five factors, these latter were omitted from further consideration. The use of the above formula selected from the nine original variables a combination of four which included the value of the whole group for predicting the criterion.

FORMULÆ FOR PARTIAL AND MULTIPLE CORRELATIONS

By means of the technique described in the preceding section the following factors were selected as significant in the distribution of trained teachers. (The numbers to the left of each factor are the variable numbers used throughout the study to designate that special factor.)

(3) Average Actual Salary per Month
(4) Excess per Legal Teacher
(6) Number of Elementary Teachers in School
(7) Length of Term

The next step was to remove from the raw correlations between training and each of the above factors (r_{13}, r_{14}, r_{16}, and r_{17}) any correlation due to relationships with other factors—in other words, to find the partial coefficients of correlation ($r_{13.467}$, $r_{14.367}$, $r_{16.347}$ and $r_{17.346}$). The formulæ for this procedure were obtained from McCall[6] by a simple substitution of the digits representing the five variables involved. Starting with the crude correlations as given in Table II, the use of the partial correlation technique gave the following results:

$r_{13.467} = .78$
$r_{14.367} = -.27$
$r_{16.347} = .20$
$r_{17.346} = .25$

TABLE VI

ZERO ORDER r'S USED IN PARTIAL CORRELATION FORMULÆ (SELECTED FROM TABLE II)

This table should read: The correlation between Variable 1 (Index of Training) and Variable 3 (Average Actual Salary) is +.84; the P.E. of this correlation is .01.

VARIABLE	3	4	6	7
1	.84 ± .01	.52 ± .01	.49 ± .01	.52 ± .01
3		.64 ± .01	.45 ± .01	.51 ± .01
4			.54 ± .01	.78 ± .01
6				.57 ± .01

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[6] McCall, W. A. *How to Experiment in Education*, pp. 236 ff.

It should be explained that the partial and multiple correlation technique is a mathematical means of "holding factors constant" and "determining the significance of factors." The interpretation of results obtained by this technique is subject to certain limitations which are best explained in a recent article by Barbara S. Burks from which the following summary is quoted:[7]

> 1. In partial correlation the true measure of contribution of a cause to an effect is mutilated if we have rendered constant variables *which may in part or in whole be caused by either of the two factors whose true relationship is to be measured, or by still other unmeasured remote causes which also affect either of the two isolated factors.*
>
> 2. The distinctive contribution of a factor to the magnitude of a multiple correlation coefficient is not a measure of its true contribution to the criterion if any of the factors entering into the multiple correlation can be described by the clause in italics above.

The Regression Equation. The next step in the technique was the derivation of a regression equation or prophecy formula from which the average index of training of the teachers in a school may be predicted from a knowledge of the average actual salary, the length of term, the excess per legal teacher, and the number of teachers in that school. The regression equation combines the status of a given school on these four factors, weighting each measure according to the partial correlation of that factor with the criterion—index of training. The formula for the regression equation needed is as follows:

$$x_1 = \left(r_{13.467}\frac{\text{S. D.}_{\cdot 1.3467}}{\text{S. D.}_{\cdot 3.1467}}\right)x_3 + \left(r_{14.367}\frac{\text{S. D.}_{\cdot 1.3467}}{\text{S. D.}_{\cdot 4.1367}}\right)x_4 + \left(r_{16.347}\frac{\text{S. D.}_{\cdot 1.3467}}{\text{S. D.}_{\cdot 6.1347}}\right)x_6 + \left(r_{17.346}\frac{\text{S. D.}_{\cdot 1.3467}}{\text{S. D.}_{\cdot 7.1346}}\right)x_7$$

Where

x_1 = the deviation of a school from the mean of the Indices of Training

x_3 = the deviation of that school from the mean Salary per Month

x_4 = the deviation of that school from the mean Excess per Legal Teacher

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[7] Burks, Barbara S. "On the Inadequacy of the Partial and Multiple Correlation Technique." *Journal of Educational Psychology,* Vol. XVII, p. 539.

x_6 = the deviation of that school from the mean Number of Teachers

x_7 = the deviation of that school from the mean Length of Term

The partial *r*'s ($r_{13.467}$, $r_{14.367}$, etc.) are as found above.

The S. D.'s of the fourth order are found from formulæ given by McCall.[8] These formulæ require certain partial *r*'s previously found and the following Standard Deviations:

S. D. Variable 1 = 105.5250
S. D. Variable 3 = 19.1002
S. D. Variable 4 = 142.8850
S. D. Variable 6 = 2.5238
S. D. Variable 7 = 18.9951

The reliability of the regression equation for estimating the index of training for a given school is found by the following formulæ:[9]

$$\text{S.D.est.}x_1 = \text{S.D.}_{\cdot 1.3467} \qquad \text{P.E.est.}x_1 = .6745\ \text{S.D.est.}x_1$$

Using the results of previous calculations in the above formulæ, the P.E. of estimating x_1 from the four factors was found to be 35.7.

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[8] McCall, W. A. *Op. cit.*, p. 243.
[9] Garrett, Henry E. *Statistics in Psychology and Education*, p. 243.

CHAPTER V

PRELIMINARY EXPERIMENTATION, MEANING AND DERIVATION OF THE MEASURES

PRELIMINARY EXPERIMENTATION

It was first necessary to determine what factors might affect the distribution of trained teachers in the state. For purposes of preliminary experimentation it was desirable to have some measure of the training of teachers. Since *The State School Facts* gave the average salary due the teachers of each county under the state salary schedule, it was decided to use this average salary as an index of training for preliminary experimentation. The validity of this assumption was proved later by the outcome of the detailed correlations, the r between Index of Training and Average State Salary Schedule being .88 ± 00. The reason for this close correlation is apparent upon examination of the salary schedule[1] in Table I which is given again here.

It will be noted that the salary varies directly in accordance with the type of certificate. Now each type of certificate has a definite value in years of scholastic training, varying from an eighth or ninth grade education, as represented by County Second Grade, through High School Graduation, as represented by High School, Grammar Grade, or Primary Certificate Class A. Each type of certificate above Elementary B (with the exception of Provisional Class C) represents one year of college or normal school training. The correlation between the Index of Training (see page 69), used as a final measure of the preparation of the teacher and the State Salary Schedule rating is not perfect (1.00) because the salary schedule gives credit for another element of teacher qualification, viz., experience. An examination of the schedule will make it clear that the teacher's salary increases in accordance with length of service as well as amount of training.

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[1] *The Salary Schedule and Classification of Schools.* State Superintendent of Public Instruction, Publication No. 51, Division of Finance and Statistics, No. 3, Raleigh, N. C.

TABLE I (Duplicate)

A GRADUATED SALARY SCALE FOR WHITE TEACHERS

(Monthly Basis)

STANDARD CERTIFICATES	EXPERIENCE RATING				
	No Yr.	1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.
High School					
Grammar Grade					
Primary					
Class A	$100.00	$105.00	$110.00	$120.00	$133.33
Class B	90.00	95.00	100.00	105.00	110.00
Class C	85.00	90.00	95.00	100.00	105.00
Provisional Class C.	75.00	80.00	85.00	90.00	95.00
Elementary					
Class A	75.00	80.00	85.00	90.00	95.00
Class B	65.00	70.00	75.00	80.00	85.00
Provisional Elementary	55.00	60.00	65.00	70.00	75.00

CERTIFICATES BELOW STANDARD

Temporary	$60.00
Provisional A	55.00
Provisional B	50.00
County Second Grade	45.00

SELECTION OF COUNTIES FOR PRELIMINARY EXPERIMENTATION

Out of the total of one hundred counties in the state, ninety were selected for preliminary determination of significant factors. These ninety counties were selected so as to give a high correlation between actual salary paid and state salary schedule rating used as the index of teacher preparation. This was done on the assumption that monthly salary was the outstanding factor in the distribution of training, an assumption which was substantiated by the findings in the final experiment (see page 31). The technique of selecting these counties was largely empirical, those ten counties being omitted which fell furthest from the line of perfect correlation. The r between the ninety counties finally selected and actual salary paid was .94 ± .006. It was considered desirable to get as high a correlation as possible between salary actually paid and the state salary schedule in order to control as nearly as possible the salary factor. The correlation obtained by omitting the ten counties indicates that the ninety counties followed the state salary schedule very closely in paying their teachers—in other words whatever supplement was paid above the minimum state schedule was proportional to the training and experience of the teacher.

Having thus controlled the element of salary in relationship to the Index of Preparation, a series of correlations were worked out to determine what factors were of sufficient significance for detailed study. In this work, data from *State School Facts,* Vol. 1, Nos. 1 to 17, were used, except where otherwise indicated.[2] The measures used were derived from county averages for the rural white elementary schools, 1923-1924. Table VII shows the results of this preliminary study:

TABLE VII

CORRELATIONS BETWEEN COUNTY SALARY AVERAGES, STATE SALARY SCHEDULE BASIS, AND VARIOUS MEASURES BASED ON COUNTY AVERAGES USED IN PRELIMINARY EXPERIMENTATION TO DETERMINE FACTORS FOR FURTHER STUDY

MEASURE USED	COEFFICIENT OF CORRELATION WITH PRELIMINARY INDEX OF TEACHER PREPARATION
Average Length of Term	.83 ± .02
Percentage of Teachers Holding Single Grade Positions	.52 ± .05
Economic Ability per Teacher, 1923-1924 *	.47 ± .05**
White Rural Population per 10,000 Acres of Farm Land ***	.07 ± .07
Per Cent of One-Teacher Schools in County	.58 ± .04

* Data from Morrison, F. W., *Equalization of the Financial Burden of Education Among Counties in North Carolina.* Table II, pp. 33-34, column 6.

** Since the relationship here was to some extent curvilinear, η was also found: $\eta = .646$. See Rugg: *Statistical Methods Applied to Education,* pp. 276-283.

*** *United States Census, 1920.* Vol. 1, Table 49, pp. 120-121; Vol. 1, p. 266; Vol. 1, p. 166; and Vol. VI, part 2, p. 232 ff.

Measures derived according to a modification of the technique described in Paul R. Mort, *Measurement of Educational Need,* pp. 41-53.

In the case of certain measures, because of crudeness of statistics available, it was not deemed necessary to work out the r for the purposes of preliminary experimentation. The value of schoolhouses per teacher employed is a case in point. The county valuations of school buildings as given in *State School Facts,* Volume I, are based on inaccurate reports of county superintendents. In this case a scatter diagram was constructed, and a positive correlation between the preparation of the teacher and the type of building was found. A similar procedure in the case of the average number of pupils in attendance per teacher, revealed the fact that there is little or no relationship between the number of children taught by a teacher in the rural elementary schools and the preparation of that teacher.

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[2] State Department of Public Instruction, Raleigh, N. C.; published semimonthly, 1924-1925.

The correlations in Table VII reveal the following tendencies in regard to distribution of trained and experienced teachers in the rural districts of North Carolina:

1. If approximately the same salary per month is offered in all the schools, those teachers with more training and experience tend to go to schools where they can teach a single grade, rather than where they have all the grades to teach.

2. Under the above conditions, better-prepared teachers accept positions in those schools which have longer terms and in those counties which have the greater property valuation per teacher employed. Better-prepared teachers do not seem to be especially attracted to those counties in which people are living closer together, but it is possible that White Rural Population per 10,000 acres of farm land is not a good measure of those isolated social conditions which one would expect teachers to wish to avoid. The above correlations do not prove the facts stated. The technique of partial correlation would have to be used to do this. The number of cases used in this preliminary experimentation (data from ninety counties) would not yield valid results for partial correlation.

On the basis of this preliminary work it was evident that a study of the following factors would yield fruitful results: (1) average length of term; (2) economic ability of the counties; (3) size of the school (a more accurate measure which combines the merits of both per cent of one-teacher schools and per cent of grade positions). Several other factors were included in the final experiment because logically they seemed to promise results which would justify their inclusion.

NATURE AND ORIGIN OF DATA USED IN THE DETERMINATION OF FACTORS

From the preliminary experimentation discussed above it was discovered that the factors affecting the distribution of trained teachers among the rural white schools were so numerous and complex that it was necessary to study them by means of the partial and multiple correlation technique. The averages for various counties which were used in the work described above did not offer material suitable for this technique for two reasons: first, since there are only one hundred counties in the state, it was impossible to get a sufficient number of cases to make the results valid; second, the measures were not accurate enough to justify such a refined technique. It became necessary to use the individual school as the unit for which measures of the various factors were obtained. In other words, the problem on which data were collected was: What are the circumstances surrounding individual schools which cause trained teachers to accept positions in one school rather than another? Data on this problem were on file in the office of the state superintendent of public instruction in what is known as *The November Budgets* of the various counties. This document is filed with the state superintendent of public instruction in accordance with Article XIII, sec. 181, of the School Code which reads as follows:[3]

> On or before the fifteenth day of November of each year, the county board of education and the board of education of all special charter school districts shall prepare a budget on blanks furnished by the State Superintendent of Public Instruction, setting forth the name and number of teachers actually employed in each district in the county, the grade of certificate held, and all other information asked for by the State Superintendent of Public Instruction.

Since these budgets are used as a means of enforcing the certification law and as a basis for apportionment of state funds, the law required that the data contained in them be as accurate as possible. Moreover, the law required that they be carefully checked in the office of the state superintendent "to ascertain whether the teachers are properly certificated, whether the number of teachers is excessive, and whether the authorized salary schedule is observed."[4]

A study of these budgets yielded data from which the following measures for individual schools were obtained:

Variable 1. Average Index of Training

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[3] *Public School Law of North Carolina* (Codification of 1923), Article XIII, Sec. 181. State Superintendent of Public Instruction, Raleigh, N. C.

[4] *Ibid.*

Variable 2. Average Monthly Salary under the State Salary Schedule
Variable 3. Average Actual Salary per Month
Variable 4. Excess Salary per Legal Teacher (the Measure of Local Initiative)
Variable 5. Percentage of Enrollment in Average Daily Attendance
Variable 6. Number of Teachers
Variable 7. Length of Term

The numbers given the variables above are the same as those used throughout the study. (See especially Table II.) In the following pages an explanation will be given of how each of these measures was derived.

AVERAGE INDEX OF TRAINING (VARIABLE 1)

When the graduated salary schedule was put into effect in 1920, it became necessary to define exactly the number of years' training represented by each type of certificate. The number of years' training above elementary school graduation for each type of certificate is shown in the following table:[5]

TABLE VIII

YEARS OF TRAINING CORRESPONDING TO VARIOUS TYPES OF CERTIFICATES

TYPE OF CERTIFICATE	NUMBER OF YEARS' TRAINING ABOVE ELEMENTARY SCHOOL GRADUATION
High School Teachers' Certificates	
Grammar Grade Certificates	
Primary Certificates	
Class A	8
Class B	7
Class C	6
Elementary Teachers' Certificates	
Class A	5
Class B	4
Provisional Elementary	4
Provisional A	3
Provisional B	3
County Second Grade	2

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[5] *Regulations Governing Certificates for Teachers in North Carolina.* State Superintendent of Public Instruction, Raleigh, N. C., Educational Publication No. 29, Division of Certification No. 11, 1921.

This equivalence between the type of certificate and number of years' training made it possible to derive an average index of training for each school. The following hypothetical case will illustrate the procedure:

DATA FOR BLANK SCHOOL

CERTIFICATES HELD BY ELEMENTARY TEACHERS	NUMBER OF YEARS ABOVE ELEMENTARY GRADUATION REPRESENTED BY CERTIFICATE
1 Primary Class A	8
1 Grammar Grade Class C	6
1 Elementary Class A	5
1 Primary Class B	7
1 Elementary Class B	4
1 County Second Grade	2
Total Years' Training	32
Number of Teachers	6
Average Index of Training for Blank School = 32 ÷ 6 = 5.33.	

In this manner the Average Index of Training was found for the teachers in the 1,393 schools studied in the final experiment.

AVERAGE MONTHLY SALARY UNDER THE STATE SALARY SCHEDULE (VARIABLE 2)

As explained above, the Graduated Salary Schedule Law required that each teacher be paid a minimum monthly salary which varies according to her academic and professional training and according to the number of years' teaching experience which she has had. In order to enforce this legal requirement the budgets filed by the county superintendents are checked against the records in the state department of certification; hence the county budgets show accurately the salary to which each teacher is entitled under the graduated salary schedule. For each school the total due the teachers under the salary schedule was found; this was divided by the number of teachers in the school to give the Average Monthly Salary under the State Salary Schedule. This minimum salary rating did not always correspond to the salary actually paid, for the reasons given in the following section.

AVERAGE ACTUAL SALARY PER MONTH (VARIABLE 3)

Article IV, Sec. 57, of the Public School Law gives the following regulations in regard to the Salary Schedule for Teachers:[6]

> Sec. 57. *A Salary Schedule for Teachers.* The State Board of Education shall adopt a uniform graduated salary schedule for all teachers, principals, supervisors, superintendents and assistant superintendents, based upon duties, training, experience, professional fitness, and continued service in the same school system.
>
> The adopted salary schedule shall be a guide to county boards of education in fixing all salaries of teachers, supervisors, principals and superintendents in the county, and it shall be considered a fair salary schedule to be presented in the budget to the boards of county commissioners.
>
> Every county board of education, or the board of trustees of a city school system may adopt a different salary schedule, but it likewise shall recognize a difference in salaries based on different duties, training, experience, professional fitness and continued service in the same school system, but if any county board of education or the board of trustees of any city school system shall fail to adopt such a schedule, the state salary schedule shall automatically be in force, and the difference in salaries suggested shall be maintained. And the county superintendent shall not approve the voucher of any teacher for a salary higher than that provided in the salary schedule, unless by action of the county board of education or of the board of trustees of the city school, a higher salary is allowed for special fitness, special duties, or under extraordinary circumstances. Whenever a higher salary is thus allowed, the minutes of the board shall show what salary is allowed and the reason for the same: *Provided,* the county board of education, upon the recommendation of the committee of a local tax district, may authorize the committee and the superintendent to supplement the salaries of all teachers of the district from funds derived from local taxes, and the minutes of the board shall show what increase is allowed each teacher in each local tax district.

It is evident from the above quotation that teachers may be paid more than is allowed under the uniform graduated salary schedule. In practice most of the rural elementary teachers are paid the minimum salary, but in some instances more is paid from either the general county fund or from local tax funds.[7] The law that a different salary schedule shall likewise recognize "a difference in salaries based on different duties, training, experience, professional fitness, and continued service in the same school system" is generally followed. That the principles of the state graduated salary schedule are usually followed is shown by the high correlation between Average Monthly Salary under State Salary Schedule and Average Actual Salary. This was found to be .91 ± .00 for a random sampling of 1,393 schools in thirty counties.

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[6] *The Public School Law of North Carolina* (Codification of 1923). State Superintendent of Public Instruction, Raleigh, N. C.

[7] See pages 17 and 18.

EXCESS SALARY PER LEGAL TEACHER (VARIABLE 4)

The word, excess, as used here means any amount paid above the minimum program required by the state. The constitution of North Carolina states that schools must be in session at least six months.[8] Where a school ran for eight months, two months' salary would be included in this excess; in cases where the teacher was paid more than the state salary schedule, the total of this excess payment was included. After the total excess for a given school had been found, this was divided by the number of "legal" teachers allowed that school. The following quotation from the school code will make clear the meaning of the term, legal teacher.[9]

> In each elementary school not more than one teacher shall be allowed except as follows: Wherever the average attendance for the previous year was at least thirty, two teachers may be allowed. . . . Wherever the average attendance was sixty-five, three teachers shall be considered reasonable, and wherever the average attendance for the previous year was one hundred, four teachers shall be considered reasonable. And one additional teacher for every thirty-five additional pupils in average daily attendance for the previous year shall be considered reasonable.

In some instances schools contained more teachers than were permitted under this law. The county budgets were carefully checked against the attendance and these extra-legal teachers were noted in each case.

After the total excess salary for a given school had been found, this amount was divided by the number of teachers actually employed minus the number of extra-legal teachers. This procedure reduced the excess to a common base for all the schools, the common base being the number of teachers provided by the state.

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[8] *Constitution of North Carolina*, Art. IX, Sec. 3, as given in *The Pubilc School Law of North Carolina* (Codification of 1923), p. 1. State Superintendent of Public Instruction, Raleigh, N. C.

[9] *Ibid.*, page 45, Sec. 176.

The above explanation may be condensed into the following formula:

Excess salary per legal teacher for any school = total all salaries paid during year — state salary schedule for six months ÷ number teachers employed — extra-legal teachers.

A concrete illustration will make the working of this formula clear.

DATA FOR SCHOOL 14, ALAMANCE COUNTY

Total teachers' salaries, eight months' term		$5,280
Amount teachers would draw under salary schedule for six months' term		3,900
Excess salary all teachers		$1,380
Number teachers actually employed	8	
Number extra-legal teachers	3	
Number teachers allowed under law	5	

$1,380 ÷ 5 = $276, excess per legal teacher.

Thus we see that *Excess Salary per Legal Teacher* is a measure of local initiative in providing trained teachers. In this measure three items of local initiative have been given weight, viz., the use of local funds for (1) increasing the teacher's salary beyond the state salary schedule, (2) for lengthening the school term beyond the six months' minimum, (3) for paying more teachers than the minimum state program provides.

Why are the above items included in the measure? The reason for including in this measure any amount used from local funds to pay a salary beyond the state schedule is self-evident. It is logical to assume that additional salary might have some attraction for the better-trained teacher. Moreover when local funds are used to lengthen the term beyond a six months' term guaranteed by the state constitution, the effect is to offer the teacher a salary in excess of that provided under the minimum salary schedule. This is true because the salary schedule operates on a monthly basis. For instance a college graduate with no experience is entitled to $100.00 per month under the schedule. If such a teacher should accept work in a six months' school her total salary would be $600.00 if the state minimum were paid. Now, suppose this teacher were to accept work in an eight months' school; her salary would be $800.00, and $200.00 of this amount would be in excess of the minimum guaranteed by the state. It is logical to assume that the larger salary might attract the well-trained teacher, despite the fact that she would have to work two months longer to get it. Under the existing law all extension of the term beyond six months must be paid for out of either county or local tax funds; hence this item in the excess is a measure of local initiative in providing funds beyond the state requirement. Having explained the salary phase of this measure, one question remains: Why is this total excess for a school divided by the number of legal teachers? The term, legal teacher, was defined above. The law allows a given number of teachers in accordance with average daily attendance. What would be the effect if a school used local funds to provide teachers in excess of this state-wide minimum program? It is reasonable to suppose that the smaller number of children per teacher and fewer grades per teacher offered by such a school would tend to attract better-trained teachers. How was this extra-teacher-in-a-school factor to be measured? Since it was necessary to divide the gross excess salary by some figure which varied with the size of the school in order to remove the element of size from this measure, the number of legal teachers was used as a divisor. By using the number of legal teachers rather than the actual number of teachers, the quotient (excess per legal teacher) was increased whenever extra-legal teachers were employed. This increase represents the weight allowed the extra-teacher-in-a-school factor.

For the purposes of this study, it was desirable to have one measure which would include those factors depending on local initiative which might influence the distribution of trained teachers. Excess Salary per Legal Teacher is a single measure including these local factors.

PERCENTAGE OF ENROLLMENT IN AVERAGE DAILY ATTENDANCE

(VARIABLE 5)

It seemed possible that certain factors influencing the distribution of trained teachers might be measured by the percentage of enrollment in average daily attendance. The state department of education has required accurate reports of average daily attendance in each school because the appropriation from the equalizing fund for teachers' salaries was based on the average number of children in attendance.[10] The statistics on enrollment were probably not as accurate as those on average daily attendance because no appropriation of funds is made on this basis; however, the enrollment for each school is reported in the county budget, this figure being computed according to uniform directions distributed to each teacher. Although possible inaccuracies in reports of enrollment detracted from the reliability of this measure, no other means of measuring the particular factors involved were at hand.

In what way might percentage of enrollment in average daily attendance measure factors affecting the distribution of trained teachers? The trained teacher might prefer to go to a progressive community—to one interested in schools. One who is familiar with rural school conditions knows that a high percentage of enrollment in average daily attendance might be an indication of community interest in the school. Also a low percentage of attendance might indicate not only a lack of interest on the part of school patrons, but also a general social backwardness due to poverty, scattered population and ignorance. An objection to using this percentage as a measure of social conditions might be made on the supposition that a better-trained teacher would increase the attendance in her school, and for that reason a correlation between the teacher's years of training, and percentage of enrollment in average daily attendance would be directly due to the training of the teacher. This objection is answered by Reavis's investigation of rural school conditions in Maryland.[11] He says:

> There seems to be only a slight connection between the total schooling of the teacher and the attendance of her pupils. Grades of certificates based on training seem to have no direct bearing upon attendance except that life-certificate holders have better attendance. These certificates represent a long period of satisfactory service. Thus it seems that although the experience of a teacher tends to increase the attendance in her room, training alone has little influence toward raising the percentage of enrollment in average daily attendance.

Accuracy in computing the percentages used was assured by use of the calculating machine.

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[10] *The Public School Law of North Carolina* (Codification of 1923), Sec. 176. Superintendent of Public Instruction, Raleigh, N. C.

[11] Reavis, George H. *Factors Controlling Attendance in Rural Schools.*

NUMBER OF TEACHERS (VARIABLE 6)

The number of elementary teachers in each school was used as a measure of a number of conditions which might attract the trained teacher. Large schools are generally found in more progressive rural communities because economic and social conditions are conducive to building up consolidated schools. Small schools are more frequently located in thinly populated areas, where economic and social conditions are not desirable. The number of teachers, indicating the size of the school, measures the sum of these conditions. Moreover the number of teachers in an elementary school determines directly the desirability of a given position for a teacher who is contemplating accepting work. In a one-teacher school the teacher generally has to give instruction in all of the subjects of all of the elementary grades. It is logical to assume that a teacher would prefer a single grade position if she can get it; and that the better-trained teachers would get into the larger schools. The number of teachers in a school, then, measures the influence of simplicity or complexity of the work as a factor in the distribution of trained teachers.

LENGTH OF TERM (VARIABLE 7)

The length of term is to some degree a factor affecting salary. The Average Actual Salary [12] (Measure 3) is the amount received per month. This figure was used because the schedule specifies a salary per month, regardless of length of term; hence a teacher's total yearly salary is the product of the actual salary and the length of term expressed in months. But the length of term is also a measure of the educational and economic progressiveness or backwardness of the school district. The state constitution guarantees a term of six months:

> Each county of the state shall be divided into a convenient number of districts, in which one or more public schools shall be maintained at least six months in every year; and if the commissioners of any county shall fail to comply with the aforesaid requirements of this section, they shall be liable to indictment.[13]

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[12] See page 71.

[13] *Constitution of North Carolina,* Art. IX, Sec. 3, as given in *The Public School Law of North Carolina* (Codification of 1923). State Superintendent of Public Instruction, Raleigh, N. C.

The state equalizing fund is apportioned for the six months' term only:[14]

> After the school term passes the six months' minimum term, each county then carries the entire burden of the extended term in that county; usually each district carries the entire burden of the extended term in that particular district.

Thus the length of term is also a measure of social and economic conditions surrounding the school. The poor, backward counties or districts have only the minimum term of 120 days; the wealthy, progressive sections of the state have extended the length of term in their schools.

NECESSITY OF USING CERTAIN MEASURES BASED ON COUNTY RATHER THAN LOCAL SCHOOL CONDITIONS

For several of the factors which it seemed desirable to measure, statistics applicable to individual schools could not be obtained. For Variables 8 (Index of Economic Ability), 9 (Percentage of Illiteracy), 10 (Rural White Population to the Square Mile), and 11 (Localized Effect of Teacher Training Institutions), only county averages could be derived. For each of these four variables the status of the whole county was taken as representative of conditions in each school of that county. Such measures represented an average of conditions within a county; hence, they were crude in comparison with the refined measures for individual schools used in Variables 1-7. The economic, educational, and social conditions of which these variables are a measure vary almost as much in an individual county as they do in the state as a whole. For instance, in every county in the state we can probably find some district as backward as the most backward county, and in almost every county we can find some one district which is fairly progressive. Despite these obvious objections to the use of county averages as measures, since the preliminary experimentation had indicated that they might be significant, four of them were included in the final correlations. Several others were eliminated, and the ones used were selected through a series of experimental correlations which are described in the following section.

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[14] Morrison, F. W. *Equalization of the Financial Burden among Counties in North Carolina*, pp 26 ff.

EXPERIMENTAL CORRELATIONS TO SELECT SIGNIFICANT COUNTY AVERAGE MEASURES

For the final series of correlations, statistics for 1,393 schools were selected from a random sampling of thirty counties, but in the preliminary experimental correlations, measures based on county averages were used. All of these county average measures were correlated with the Average Index of Training (Measure 1) for the thirty counties. This experimentation was based on the supposition that if a county average measure did not show a significant correlation with the average index of training for the counties, when this average measure was correlated with the index of training for individual schools, it would not be significant. That this assumption is valid was proved by the final correlations. Table II gives the correlations of county average measures (Variables 8, 9, 10, and 11) with the criterion (Index of Training, Variable 1) when the individual school is taken as a unit. Table IX gives the same correlations when the county is taken as a unit. The fact that the correlations are decreased when the school is used as a unit, validates the assumption on which this experimentation was based.

TABLE IX

COEFFICIENTS OF CORRELATION BETWEEN AVERAGE COUNTY INDEX OF TRAINING AND VARIOUS COUNTY AVERAGE MEASURES

VARIABLE	MEASURE USED	COEFFICIENT OF CORRELATION WITH AVERAGE COUNTY INDEX OF TRAINING (30 COUNTIES)
8	Index of Economic Ability	.84 ± .04
9	Percentage of Illiteracy	—.45 ± .10
10	Rural White Population per Square Mile	.39 ± .10
11	Localized Effect of Teacher Training Institutions	.78 ± .05
12	Number of White Farmers per Square Mile	—.10 ± .12

DERIVATION OF COUNTY AVERAGE MEASURES

In order to make the meaning and nature of these county measures clearer, in the following pages the source of the data and the methods by which the measures were derived will be explained.

INDEX OF ECONOMIC ABILITY PER LEGAL TEACHER (VARIABLE 8)

The Index of Economic Ability for all counties of North Carolina was worked out by Morrison in his study of the equalization fund in North Carolina.[15] His formula for this index is:

Index of Economic Ability = Income Tax Paid in 1923 + 1/100 of Property Valuation (Av. 1920 + 1923)

This index represents the relative wealth of the various counties and is used by Morrison as the criterion of economic ability to be used in reorganization to secure equalization of the present minimum program.[16] In order to eliminate an irrelevant factor—difference in school population among the counties—the Index of Economic Ability for each county was divided by the number of legal teachers in that county. The following example illustrates the procedure:

Index of Economic Ability, Alamance County = $442,044
Number of legal teachers = 103
$442,044 ÷ 103 = $4,291, the measure used.

The number of legal teachers was used as the divisor rather than the actual teachers employed because legal teachers measure more accurately variations in school population among the counties.

PERCENTAGE OF ILLITERACY (VARIABLE 9)

The data for this measure were obtained from the United States Census for 1920.[17] The percentage of native white illiteracy among the inhabitants ten years old or over was used. These percentages varied from 4.1 per cent in Guilford County to 13.3 per cent in Surry. The expectation was that the percentage of native white illiteracy might be indicative of conditions which would make a position more or less desirable to a prospective teacher, and that this percentage might vary with the community standards as to what training a teacher should have. Such standards, of course, generally find expression through the local school committee, hence, it would have been much better to use the percentage of illiteracy in each school district, but this was not available. The county-wide measure would have been more accurate if it had been possible to get figures in regard to rural illiteracy, separate from urban illiteracy. These data were not given in the United States Census and could not be obtained; hence the illiteracy figures for each county as a whole were used.

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[15] Morrison, F. W. *Equalization of the Financial Burden of Education among the Counties in North Carolina,* Table II, pp. 33-34, Column 6.

[16] *Ibid.,* pp. 47-48.

[17] *United States Census, 1920.* Vol. III, p. 735 ff.

RURAL WHITE POPULATION PER SQUARE MILE (VARIABLE 10)

The purpose in using this measure was to furnish an index of the relative isolation of communities due to variations in density of population. It seemed probable that, other things being equal, teachers would prefer to work in communities where possibilities of social contacts were numerous rather than in rural sections where the population was thin and scattered. Since the census definition of rural population did not correspond with the meaning of rural as applied to schools in North Carolina,[18] it was necessary to derive the data for the rural white population according to the following method: From the total white population of the county was subtracted the white population in special charter districts, the names of special charter districts (i.e., districts which are not rural) being obtained from the report of the state superintendent of public instruction.[19] Population data for the counties and special charter districts were obtained from the United States Census, 1920.[20] The rural white population for each county was divided by the land area in square miles for that county. This was done in order to remove extraneous factors due to differences in area among the counties and to reduce the population statistics to a common unit.

NUMBER OF WHITE FARMERS PER SQUARE MILE (VARIABLE 12)

This measure represents another attempt to get an index of relative isolation of communities. The conditions represented by this measure were thought to be practically identical with those contained in rural white population per square mile. Both of these were included in the preliminary experimentation in order to find which had the more significant correlation with Index of Training. It seemed from the logic of things that the number of farms per square mile in a county would give a measure of relative social isolation and that this might have an effect on the type of teacher who would seek work in the community. Where farms are large, homes are scattered and isolated; where farms are small, dwellings tend to be closer together. The number of farms to the square mile is to some extent a measure of the largeness or smallness of farms. The amount of waste or undeveloped land is not given any weight in these statistics; therefore, they do not constitute an ideal measure of relative social isolation; also, factors having to do with roads and transportation are not included. This measure did not show a significant correlation with the Average Index of Training in the preliminary experimentation to select significant county average measures,—(See Table IX); hence, it was not included in the final correlations.[21]

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[18] The United States Census Bureau defines as rural any village which does not have a population of 2,500 or more. A school is considered rural in North Carolina unless it is located in a special charter district, and some of these have populations of less than 1,000.

[19] *Biennial Report 1922-1923, 1923-1924.* State Superintendent of Public Instruction, Raleigh, N. C.

[20] *United States Census, 1920.* Vol. I, Table 49, pp. 120-121; also, Vol. I, p. 266.

LOCALIZED EFFECT OF TEACHER-TRAINING INSTITUTIONS
(VARIABLE 11)

Authorities on professional education of teachers recognize the fact that a teacher-training agency places a large proportion of its graduates in the territory contiguous to the institution. Judd and Parker give the following statement of this principle:[22]

> As soon as one begins to study the question from this point of view (i.e., localization of the influence of an institution), he meets the well-established principle that all higher educational institutions draw their students largely from within a radius of a comparatively few miles. A corollary of this principle as applied to normal schools is that "in the long run, each community has to raise as many teachers as it needs." Furthermore, the services of a normal school to the different parts of the community diminish rapidly as one travels away from the center where it is located.

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[21] Statistics from which the number of farms per square mile were derived were obtained from the *United States Census, 1920.* Number of farms occupied by white people in each county from Vol. VI, Part 2, p. 232 ff; lines 6 and 7. Land area of counties in square miles, Vol. I, pp. 120-121. The measure was obtained by dividing the number of white farms in a county by the land area of that county.

[22] Judd and Parker: *Problems Involved in Standardizing State Normal Schools* pp. 25-26. Department of Interior, Bulletin 1916, No. 12, Government Printing Office, Washington, D. C., 1916.

Dearborn in a recent study of the Oswego Movement[23] shows the counties of New York state in which Oswego graduates taught from 1862-1886. Out of 1,252 graduates working in New York state, 459 were in Oswego and contiguous counties. This was 36.7 per cent of the total. When allowance is made for the fact that the Oswego State Normal and Training School placed teachers not only in New York state, but also in many states of the union, it is evident that these data confirm the principle stated by Judd and Parker.

It would seem, therefore, that the distribution of trained teachers in a state would depend largely upon the location of agencies for training teachers; that, other things being equal, trained teachers would be clustered rather closely around the institution from which they graduated. In order to discover to what extent this factor affected the distribution of trained teachers in North Carolina, a study of the placement of graduates from the various teacher-training agencies was made.

From the files of the State Department of Certification at Raleigh, N. C., a study was made of a random sampling of 2,000 graduates of various institutions teaching in the public schools of North Carolina during 1924-1925. There are approximately 20,000 white teachers in the state and it is safe to estimate that one half of these are not graduates of any institution above the secondary level. One can be fairly certain, then, that the 2,000 graduates selected at random represent at least 20 per cent of the total number of graduates of higher institutions working in the state. Such a sampling is adequate to give a picture of the relative importance of teacher-training agencies. These teachers who had graduated from some higher institution were distributed according to several schemes of classification: first, as to whether they were teaching in elementary or high school; then, these elementary teachers were divided into two classes, (*a*) those teaching in city elementary schools; (*b*) those teaching in rural elementary schools. Out of the original sampling of 2,000 teachers who had graduated from some higher institution, it was found that 373 were at work in rural white elementary schools. Since the purpose of this whole procedure was to measure the effect of the higher educational institutions towards improving the training of the rural white elementary teachers in each individual county in the state, these 373 teachers were distributed on a double entry table according to the institution from which they graduated and according to the counties in which they were teaching.[24] The outcome of this technique was as follows: The relative importance of the various higher institutions in supplying graduates to the rural white elementary schools was known for each county of the state. This was shown by the number of the teachers out of the total 373 teaching in a given county.

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[23] Dearborn, Ned. H.: *The Oswego Movement in American Education*, p. 103, Table H.

A study was then made of the location of the teacher-training agencies relative to the counties studied with the purpose of finding the general area which that institution served. When the distribution of the graduates of the various institutions in the various counties was studied in connection with a map of the state, it was clear that each institution served a certain area which varied with the size of the institution. This area was defined as the area of localized effect, and any teachers distributed in this area were used in working out the measure of localized effect. Teachers distributed to counties by what appeared to be chance were omitted from further calculations; however, only one per cent of the teachers studied were eliminated on this basis. When the number of graduate teachers distributed in a given county by nearby institutions of higher education was known, it became necessary to weight each of these teachers so as to make allowance for differences in the number of years required for graduation. For instance, an institution turning out a given number of graduates with two years of training above high school does not have the same effect on improving the training of teachers in adjacent counties as does an institution which graduates the same number of teachers, but gives them four years of higher education. In order to allow for this difference in standards, the teachers from each school were weighted according to the type of certificate allowed by the state department to graduates of that institution; hence, the measure finally calculated for each county was in terms of the number of years of training furnished by local institutions rather than the number of teachers. This number of years of training for each county was divided by the number of teachers in the county to give the Measure of Localized Effect which was used in the final correlations.

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[24] The list of institutions studied will be found in the *Directory of the School Officials of North Carolina,* Educational Publication No. 93, Division Publication No. 24, December 1925. State Superintendent of Public Instruction, Raleigh, N. C.

This attempt to measure the localized effect of a teacher-training institution has the following defects: (1) It considers only graduates of the institution, the assumption being that teachers who leave school prior to graduating are proportional to those graduating from each institution; this assumption may be false. (2) It is based on a sampling of only about 20 per cent of the graduates for only one year. A study of the distribution of all the graduates of higher institutions over a period of years would yield a more accurate measure. The data for such a thorough study of this phase of the problem were not available.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study has undertaken to determine the factors affecting the distribution of trained teachers in the rural white elementary schools of North Carolina. Such an investigation is important because North Carolina has attempted by means of salary and certification laws to regulate the salary of teachers according to their training and experience. Since the distribution of the equalization fund is based on the state minimum salary schedule, it is important from the standpoint of the equalization of educational opportunity to know how actual salaries are related to the training of teachers, and to find what factors along with salary make positions attractive or unattractive to teachers. These facts also make it possible to evaluate the effectiveness of the salary and certification schemes which have operated in North Carolina during the last five years and to judge to what extent the single salary feature of the North Carolina law has helped to raise the standard of training in the rural schools. Having found the conditions which cause poorly-trained teachers to accept work in certain types of schools and well-trained teachers to go to others, the study has proposed specific recommendations for the purpose of equalizing the distribution of trained teachers. The data gathered and studied showed that the present salary schedule should be revised so as to make minimum salaries more nearly equal to existing salaries. Principles and techniques for setting up new salary schedules and revising existing ones have been derived from this study of North Carolina's attempt to solve an important problem in the field of state administration of schools.

A SUMMARY OF THE METHOD USED

Through preliminary experimentation using data from ninety selected counties, it was found that the average length of term, the size of the school, and the economic ability of the counties varied with the training of the teachers in those counties. It was decided, then, to set up an investigation for the purpose of finding the most significant factors affecting distribution of trained teachers in the state. Using data from thirty counties and 1,393 schools, correlations among eleven factors were found. Four of these were county average measures which had been previously selected as significant by means of preliminary experimentation. The inter-correlations among the eleven factors included in the final investigation were used in finding the most significant factors by the multiple ratio correlation method. By the short-cut formula to the multiple coefficient of correlation, four measures were found to be significant in the distribution of trained teachers, viz., monthly salary, the expenditure of local funds to enrich the minimum state program, number of elementary teachers in school, and length of term. The partial coefficient of correlation between index of training and each of these four factors was found. Also a regression equation for predicting training from a combination of these four factors was worked out. The factors affecting distribution of trained teachers having been determined, these were applied to the study of four problems:

(1) How effectively have the salary schedule and certification laws regulated salary according to the training of the teacher?

(2) What has been the effect of the salary schedule toward improvement in the training of elementary rural teachers?

(3) Is the cost of salaries under the schedule a valid measure of educational need in North Carolina?

(4) How may the opportunity to get trained teachers be more nearly equalized for the backward schools?

It was shown that a revision of the present salary schedule is needed, and a technique for setting up salary schedules in general was suggested.

CONCLUSIONS

1. Conclusion relative to the effectiveness of the salary schedule in operation:

Since monthly salary was found to be the preponderant factor in the distribution of trained teachers in the state, and since actual salaries are closely correlated with the monthly salaries under the state schedule, it follows that the purpose of the salary schedule, viz., to coördinate the salary of the teacher with her training, has been realized in practice.

2. Conclusion relative to the effect of the salary and certification laws on the improvement of the training of teachers in the rural schools:

Although the facts presented do not prove that the state minimum salary schedule with its single salary feature has improved the training of the elementary teacher, they show that this is probably true. An intensive study of the output of the teacher-training institutions in the state, so as to compare the percentage of their graduates who accepted work in the elementary schools prior to the enactment of the single salary schedule with the percentage now accepting positions in such schools, would yield valuable evidence on this problem.

3. Conclusion in regard to the use of the salary schedule in measuring the educational need of counties in the state and as a basis for distribution of the equalization fund:

The theoretical objections to the use of the cost of teachers' salaries under the schedule as the measure of educational need will be outweighed by practical considerations provided the present glaring inequalities in the distribution of trained teachers are equalized by (*a*) enriching the minimum state program, (*b*) revising upward the present salary schedule, and (*c*) applying a special salary schedule in backward schools.

4. Conclusions relative to the equalization of the opportunity of the backward schools to get well-trained teachers:

The state may equalize the opportunity of such districts to get trained teachers by enriching the minimum state program in three respects: (*a*) increasing the length of term, (*b*) encouraging consolidation of schools, (*c*) increasing salaries of teachers in backward schools.

RECOMMENDATIONS AS TO ENRICHING THE MINIMUM STATE PROGRAM AND REVISING THE SALARY SCHEDULE

In order to equalize the opportunity of the backward districts to obtain well-trained teachers, the following recommendations are made:

1. The state minimum term should be extended by constitutional amendment to eight months.
2. The state should create a special equalization fund for providing the cost of transportation in backward counties.
3. Until the state-wide minimum term can be put into effect a minimum yearly salary based on eight times the monthly salary should be allowed in all schools regardless of length of term.
4. A special salary schedule for teachers working in one-room schools having short terms should be adopted.
5. The basic salary schedule for all schools should be revised to allow salaries corresponding more nearly to the actual salaries now paid.

A technique for setting up the revised schedule is suggested. Recommendations 3 and 4 may be considered as alternatives. Both should not be put into effect.

VALIDITY OF THE CONCLUSIONS AND RECOMMENDATIONS IN THIS STUDY FOR OTHER STATES

The fact that North Carolina has been able to regulate in practice the salaries of teachers according to their training indicates that salary and certification laws similar to those of North Carolina would accomplish the same end in other states having comparable conditions. It is probable that such legislation will tend to improve the training of teachers in the rural schools of such states if the salaries are fixed at a level sufficiently high.

Conclusion 3 (relating to the use of the salary schedule as the measure of educational need) and conclusion 4 (regarding the equalization of the opportunity of backward schools to get trained teachers) apply only to North Carolina.

All of the recommendations made apply only to North Carolina with the exception of the technique suggested for setting up and revising salary schedules. The use of such a technique would be valid for revising minimum salary schedules under any conditions. The use of correlations to study the existing relationships between salary, training, and experience is a valid method of determining present practice in a state which has never had a salary schedule for its teachers. Where city school systems find it desirable to revise upward a minimum salary schedule, the use of the technique recommended in this study would be valid.

This study indicates that one of the main defects of the North Carolina schedule is the use of the monthly rather than the yearly basis in fixing the minimum salary of teachers. The handicap under which the short term schools in the state have been placed in the matter of getting trained teachers suggests the following principle for the construction of state minimum salary schedules: The yearly salary rather than the monthly salary should be the basis for minimum salary schedules in states where the length of term varies considerably. Having determined the proper monthly salary this should be converted into a yearly salary by using the formula:

Minimum yearly salary = Average length of term of all schools expressed in months × monthly salary as determined. The use of the average length of term as a multiple in fixing the minimum yearly salary will tend to equalize educational opportunity in short term schools.

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